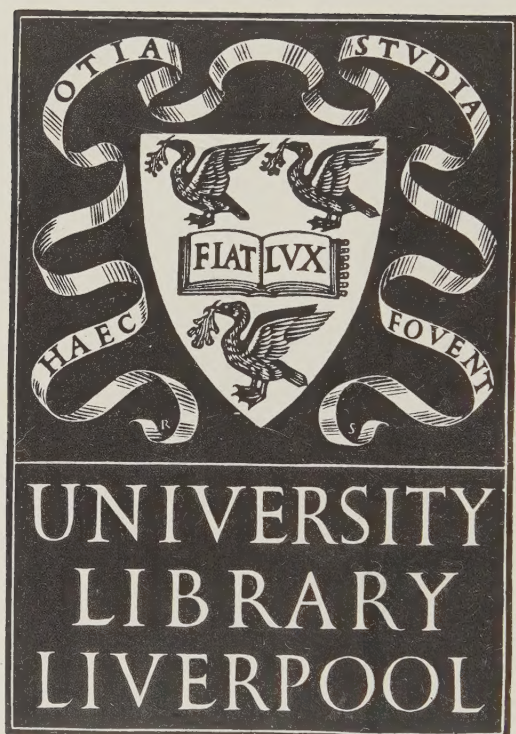


HANDBOOK OF TESTS

CYRIL BURT



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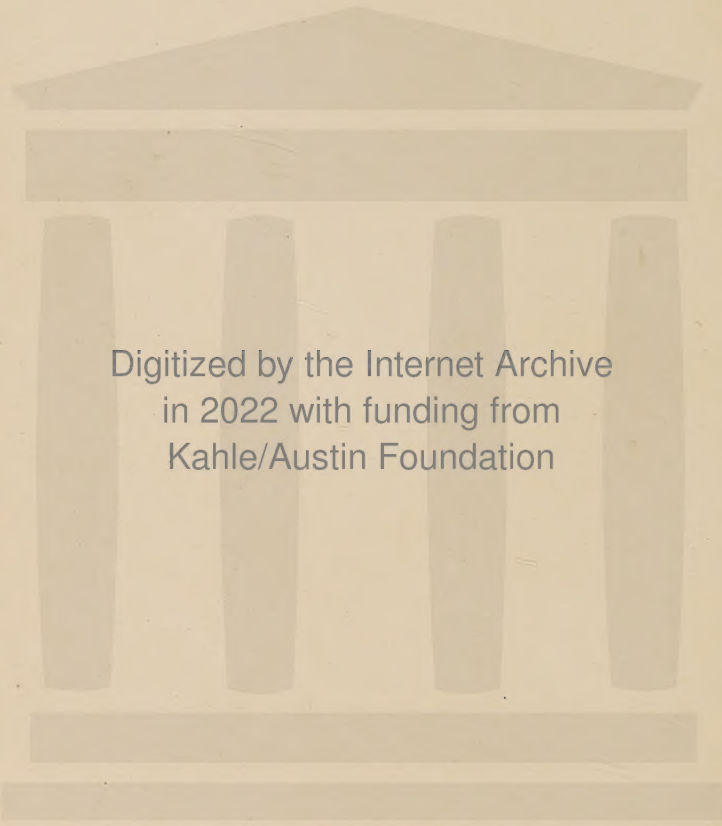
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HANDBOOK OF TESTS



HANDBOOK OF TESTS

FOR USE IN SCHOOLS

BY

CYRIL BURT, M.A., D.Sc.(Oxon.)

Psychologist in the Education Officer's Department
of the London County Council

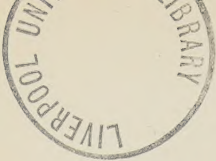


LONDON

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ORCHARD HOUSE,

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*The London County Council accepts no
responsibility for any opinions or con-
clusions expressed in this book.*

PREFACE.

This handbook contains test-materials for measuring the intelligence and attainments of children of school age. The tests are taken from my larger report already published by P. S. King and Son, Ltd.¹ Many appeals have been received from school masters, school mistresses, and school medical officers, and from teachers' and head-masters' associations, urging the separate publication of the test-materials in a cheap and portable shape. And, in acceding to these requests, I am still further encouraged by the conclusions reached and formulated in a recent Board of Education pamphlet upon *Tests among Retarded Children*. "It would appear" (says the report, in one of its final paragraphs) "that tests in scholastic subjects, standardised for age, would prove of the greatest value to teachers and others. They would enable teachers to discover whether the children were improving or otherwise; and might be very helpful in suggesting the causes of such changes."² To make such tests more widely accessible, or at least to provide rough models for their future construction, is the chief purpose of this little book. That its user is already acquainted with the value and technique of mental testing, I have ventured throughout to assume.³

To the London County Council I am indebted for permission to reprint the portions extracted from my *Report*: and to numerous friends and correspondents—teachers, doctors, inspectors, and psychologists—I owe the most grateful acknowledgments for their criticisms and advice. In considering what particular tests might most usefully be selected, and what general form the compilation might most serviceably take, I have been greatly aided by their suggestions.

I have brought together, in the introductory pages that follow, the minimum of explanation needful for the use of each test. For the most part, the test-materials will be found to explain themselves. The manner in which the scales have been framed and standardised, and the way in which they may best be applied and interpreted, will be found discussed in greater detail in the volume from which they have been drawn.

C. B.

(¹) *Mental and Scholastic Tests*. P. S. King and Son, Great Smith Street, S.W. (Second Edition, 1922.)

(²) *Board of Education; Educational Pamphlets*, No. 44. H.M. Stationery Office, 1923, p. 87.

(³) The teacher wholly new to the aims and methods of psychological testing should be referred to Dr. Ballard's excellent and attractive books dealing with *Mental Tests* and *Group Tests* respectively. (Hodder and Stoughton, 1920 and 1922.)

INSTRUCTIONS.

I. SCHOLASTIC TESTS

For those untrained in psychological methods the tests of school attainments will be the most easy to apply. The tests of reading, spelling, and arithmetic, therefore, may well be administered first of all. Rarely will it be necessary—seldom, indeed, will time permit—that every one of the scholastic tests should be given in succession to the same individual. To set more than one test of reading (for example), or more than one test of arithmetic, is hardly necessary, except in cases of special defect. In a rapid oral examination it will usually be enough to give the vocabulary test for reading (Test 1) and the mental test for arithmetic (Test 8). In a class examination or “group test,” it will often be sufficient to set five to fifteen sums from each of the written tests (Tests 9 and 10), and to dictate thirty words from the test for spelling (Test 6). With an ordinary or average class the words or sums selected should include, not merely those assigned to the age of the children, but also those for the year below and the year above. With an exceptional class, whether unusually bright or abnormally backward, mental age rather than physical age should be considered in choosing appropriate tests. The mental, or, more strictly, the educational, age can be roughly deduced by the following equations:—

$$\begin{aligned}\text{Age} &= (\text{Standard} + 6) \text{ years,} \\ &\text{or } (\text{Grade} + 3) \text{ years.}\end{aligned}$$

Thus, a child of the level of Standard IV should be tested with tests for the years 9, 10 (= IV. + 6), and 11; a child in an infants' grade iii. with tests for the years 5, 6 (= iii. + 3), and 7.

Where a more accurate survey of the child's educational attainments is required, it will be desirable to extend the selected test-problems above and below even these broad limits; and to employ, not only one or more of the tests for reading, spelling, and arithmetic respectively, but also tests for handwriting, drawing, and composition.

The scales have, every one of them, been scientifically standardised by prolonged experiments upon over five thousand children. Most of the scholastic tests are so constructed that it is possible to determine immediately the child's mental age for each one of the several subjects; and, by applying the above equation in its converse form, to infer the child's appropriate standard or class.

Test 1. Reading. Graded Vocabulary Tests

Of all the reading tests the graded vocabulary has the widest range. It is suitable for almost any child who has learnt to read; and, being both quick to administer and most suggestive in its implications, forms by far the best point at which to begin the general testing.

In actual practice the speediest way to apply it is the following. The child is asked to read the words in the first column (“to, my, his, sad, that, just, carry,” *etc.*), until he hesitates or fails. This of itself in a few seconds

yields a rough preliminary notion of his mental age for reading. He is then shown each of the ten words on the line above the word that he has just failed to say ; and is told to read on, line by line, until he fails with at least five words in succession. The words are graded in order of increasing difficulty ; and, as a rule, it will be discovered that the examinee breaks down at a fairly definite point. Should, however, his failures and his successes be irregularly interspersed, it will be essential to carry him back until he reads at least five easier words on a single line without an error ; and perhaps ask him to look along the harder lines which follow, and to pick out any additional words that he knows.

The child's mental age for reading can be calculated at a glance. Each word counts as a tenth of a year ; and the test begins with the ten words which should be read by an average child aged four last birthday. Suppose, for example, that a boy reads the whole series correctly as far as the word "village" (thirty-second on the list, as the numbering shows), and fails with all the rest ; he scores a mental age of $(4 + \frac{32}{10}) = 7.2$ years. If he reads as far as "tongue," his mental age is evidently 8.0. If, in addition to reading continuously as far as this particular word, he rightly pronounces (say) some thirteen words scattered over the remainder of the sheet, his mental age is $(8 + \frac{13}{10})$ years, that is, 9.3. The figures at the left usually enable the mental age to be read off instantaneously. In the rare cases, where the child's errors are dispersed with extreme irregularity, it is quicker to count up, by the aid of the right-hand column, first the number of the words correctly read, and then to compute the mental age by the following equation :—

$$\text{Reading Age} = (4 + \frac{\text{No. of words}}{10}) \text{ Years.}$$

Test 2. Reading. Letters and Figures.

For a child who can read no words, the only measure of reading ability that is practicable consists in determining the number of letters he can rightly name. Test 2 will serve this purpose : it will be principally needed with infants and young defectives. At times the teacher or school doctor may also wish to test the child's power to read Arabic numerals. The figures and fractions printed at the bottom of the page are adapted to this purpose.

Test 3. Reading. Monosyllables.

Children whose reading is limited to words of two or three letters can neither be discriminated very sharply, nor graded very accurately, by the progressive Vocabulary Test. For them the best measure is a speed test, confined to simple and uniform matter. Short monosyllables supply this want. The child is asked to read the words as quickly and carefully as he can ; and the examiner records the number read correctly in sixty seconds. As before, the amount can at once be reckoned by the figures in the right-hand column. Should the examiner prefer to convert the total so obtained into a mental age for reading, he must employ the table of norms given in the larger volume.¹ From that table it will be seen that an average boy

⁽¹⁾ Here and elsewhere the references appended beneath the titles test of each give the pages in the larger volume (*Mental and Scholastic Tests*, Second Edition), where detailed instructions and tabulated averages are to be found.

of $10\frac{1}{2}$ years reads almost exactly 100 monosyllables in one minute. A boy of $11\frac{1}{2}$ should read 109 words. When needed, the intermediate fractions of a year may be estimated by interpolation. Anyone repeating this test on an extensive scale will find it conducive to rapid scoring if he keep a separate copy for himself, and write over each word the fractional mental age which a breakdown at that point should represent.

Test 4. Reading. Comprehension (Graded Directions).

The foregoing tests of reading measure either mere mechanical accuracy or else mere fluency and speed. The present test, and those that follow it, measure comprehension, that is, the ability to read with understanding. For Test 4 the examiner will require a little simple apparatus—a small open box, a dozen pins, a pencil, and a book. To ensure exact results it is better to cut out the reading-matter, and to paste each paragraph or problem upon a separate card. For questions 9 and 11 the child can then hold the card in his hand. Each problem is shown to the child with an explanation such as the following. "Read what is on this card, and do what it says. You need not read it to me aloud. But you must do what it tells you." For rough purposes, however, it will suffice if the examiner hands the book to the child, and covers with a blank paper all the sentences that follow the particular one which the child is to obey; so that, having read the question, he pauses to reflect upon it, and is not confused by the printed matter on the remainder of the page.

Each question for ages six and seven counts as a fifth of a year; and each of the others as the equivalent of a whole year. A test of this type is only suited to young or dull children whose mental age for reading lies between six and eight. It will prove most serviceable for borderline defectives.

Test 5. Reading. Comprehension (Continuous Prose).

This is a test of intelligent reading for older and brighter pupils. The passage is to be read by the child aloud; and he is then asked the questions enumerated on pages 14 and 15. Mental ages for this test can be calculated, if desired, from the tables referred to on page 12.

Test 6. Spelling. Graded Vocabulary Test.

The construction of this test is identical with that of the reading test, except that it begins at age five instead of age four. The words should be dictated by the examiner, and written out by the child. For an oral test with a single individual it is quicker to request the child to spell the words aloud; for practical purposes the results so obtained may be treated as identical with those procured when the words are written instead of spelt. The mental age for spelling can be read off from the figures shown at the side, or calculated from the following equation:—

$$\text{Spelling Age} = \left(\frac{\text{Words Correct}}{10} + 5 \right) \text{ Years.}$$

For hints on the analysis and treatment of spelling difficulties discovered by this test the reader may be referred to the section on that subject in the large volume (pp. 290-5).

Test 7. Dictation.

As with reading, so with spelling, it is sometimes desirable to test the child's capacity with consecutive prose instead of with bare isolated words. For the graded dictation test, printed for this purpose on page 17, it is necessary to count up, in the child's written exercise, not the number of correct words, but the number of correct letters. Mental ages can be calculated from the average given in the table cited. But, unless both the dictating and the marking (neither in itself a very easy affair) follow precisely the directions there set out, the results from this test, though sufficiently comparable amongst themselves, must not be too closely compared with the tabulated norms.

Tests 8, 9, and 10. Graded Arithmetic Tests.

The arithmetic tests are framed upon the same basis as the graded vocabulary tests for reading and spelling. With the oral or "mental" test, each problem, as before, counts as one-tenth of a year. But for rapid estimates, where fractions of a year are unnecessary, it will often be enough to set only one or two questions from each group of ten. In a class-test the answers may be written down on slips of paper instead of being returned by word of mouth.

A similar abridgment may be adopted with the written tests. A few selected questions, one from each year, are all that is necessary to determine very roughly the child's mental age for paper-work in arithmetic. If, however, the test is used with a fairly homogeneous class of children, whose mental age or standard is approximately known beforehand, it will be better to take all the ten problems from the appropriate set, *e.g.* with children in Standard IV., the five mechanical tests and the five problem tests allotted to age ten. If the class is at all uneven in its composition, it will be essential to extend the examination over two or three sittings, and include the ten tests from the year below and from the year above.

There are no time limits for these tests. The questions should be manifolded, and the answers worked upon a separate sheet of paper. Where the cost and labour of duplicating has to be avoided, the teacher may write out the several questions upon the blackboard in the traditional way.¹

Tests 11-14. Arithmetic. Four Fundamental Rules.

Here each child must have a separate copy of the sums, and write his answer upon the test-sheet in the space provided.² The tests are speed-tests. Five minutes exactly are to be allowed for each. And, if printed copies are not available, care should be taken in the manifolding to see that every figure is large and legible, and every copy clear and intact.

The measure of ability is the number of processes accurately worked in the time allotted—for addition the total number of columns correctly added, for other sums the total number of figures correctly subtracted, multiplied, or divided. This means, as a rule, simply counting the right figures in the answer, reckoning, in the addition paper, the "hundreds" as belonging to the "tens" figure, and, in the multiplication paper, the "ten thousands" as belonging to the "thousands." To facilitate marking, the

(¹) It is hoped shortly to issue these and the following tests, in a form suggested by the London Head Teachers' Association, printed upon separate sheets, which may be distributed among the class, and so that each child may have his own copy before him.

(²) A number of test-blanks, printed in a larger type, remain over from my own investigations, and can be obtained by writing to me at the County Hall, S.E. 1.

sums are printed in rows of five or ten ; so that for each line of accurate answers the child scores, no matter which rule is being worked, exactly twenty marks.

With these exercises in the four main processes of arithmetic, as, indeed, with every ungraded type of test, the teacher who desires to calculate mental ages, or to compare the accuracy of his own class with the average performances of similar children, must again be referred to the larger memorandum (see references on p. 28).

In the more distinctly qualitative subjects—as drawing, handwriting, and English composition—the measurement of merit is a more delicate affair. Even here, however, the use of an age-scale is not impossible. In my fuller report I have reproduced typical specimens of children's work in the subjects at each successive year ; and a comparison with these samples makes a rough mental age assignable for these elusive qualities as well. But, since an examiner does not willingly carry about with him a cumbersome set of costly illustrations and tables (and, indeed, if he is enterprising, prefers usually to compile his own), I have not deemed it necessary to include in this handbook any scales for subjects more rarely tested. Tests for the fundamental branches of the ordinary elementary curriculum are all that I have sought to provide.

General Recommendations.

In applying and interpreting any test of school attainments, certain precautions must be observed. Tests are time-savers. They cannot pretend to yield greater accuracy or to afford fuller information than can be got from the considered judgment of an experienced and observant teacher. The age-basis of the scales may serve to indicate what are the average performances of London children at each successive year ; and may even help to allocate the steps and stages of each subject to be aimed at in drawing up the syllabus for a given class. But it must be kept always in mind that the norms of attainment are no more than averages ; and an average approaches an inferior or unsatisfactory performance quite as nearly as it approaches a superior or satisfactory one ; it is a record of fact, not an ideal to be achieved—a guide not a goal.

Nor should the teacher rest content with simply marking the results of a test, and determining a mental age. He must scrutinise the kind and type of inaccuracy as well as measure its bare amount. If a child of ten has a mental age of only eight for reading, and, it may be, one of scarcely seven for spelling, the examiner who is genuinely examining goes on to search for the causes. His first step will be to note the nature of the errors made, the sort of word misspelt or mispronounced. Does the child, in his reading, fail with "phonic" words and succeed with "look-and-say" ? Does he, in his spelling, omit letters, transpose letters, or insert letters—does he confuse words of a similar sound, or does he produce collocations of letters which should be sounded quite differently to what he intends, or which cannot be sounded at all ?

Of this intensive analysis of the backward child's work much will be done by the enterprising teacher, aided and instructed by nothing but his own spontaneous common sense. Some help perhaps may be derived from the classified schemes of common errors and mistakes given in my larger book ; and some practical suggestions upon the treatment of the more frequent kinds of special disability may be gleaned from illustrative cases there described. The greatest benefit, however, will only be reaped after continued experience and repeated trials with the same simple system of

tests. It is my hope that the examiner who uses these scales will regard them, not as a final product, to be mechanically applied and automatically interpreted, but as a rough model for the further construction of test-scales of his own.

II. INTELLIGENCE TESTS.

With new or backward pupils, the teacher, besides testing their acquired attainments, should obtain some estimate of their inborn capacity or intelligence. For this purpose I have included test-materials for three intelligence-scales—the Binet-Simon Tests, the Porteus Maze Tests, and my own Tests of Reasoning. Brief notes on the administration of these several scales will be found prefixed to the test-materials (pp. 40, 91, and 96 respectively).

1. Binet-Simon Tests.

For measuring mental ability apart from school attainments the simplest and most popular tests in existence are those devised by Binet and Simon. They enable the examiner, within the space of half an hour or so, to discover a child's mental age for intelligence. Incidentally, they often yield suggestive information as to specific capacities—memory, observation, reasoning, and the like. They are, however, far from perfect. Schooling affects them far more than has hitherto been supposed. Nevertheless, they form the most convenient set of tests that can be put into the hands of the teacher or school doctor, who has enjoyed no special training in a psychological laboratory. Without such a training more technical tests could hardly be attempted and even results obtained with the Binet Scale can claim no more than an approximate validity.

Innumerable versions of the Scale have been published by Binet, Simon, and their followers in different countries. All, however, as they stand, are unsuited for use in England. The present arrangement has been worked out with the advice of Dr. Simon, the only surviving author of the Scale, and with the aid of nearly every British psychologist who has published investigations upon the tests. Its two main features are the detailed reformulation of the instructions and the procedure, to suit the requirements of intelligence-testing in England, and the complete re-standardisation of the age-assignments, on a basis of prolonged experiments with over three thousand children.

2. Graded Reasoning Tests.

The Binet-Simon Tests are in my view suited only for the lower mental ages, that is to say, for younger children who are normal (*e.g.* those just promoted from the infants' department), and for older children who are backward or defective. For older and brighter children—for example, those of scholarship age and ability—the Binet Tests are of smaller value. Reasoning tests or group tests will be found to yield more accurate results.

Here I have given only my shorter list of reasoning tests. For most purposes a dozen graded problems is all that is required. A fuller account of the construction and the use of these tests, together with a longer scale containing five problems for every year, will be found in the *Journal of Experimental Pedagogy* (Vol. V, 1919, No. 2, pp. 73-7) or in Dr. Ballard's book on *Mental Tests* (pp. 90-105).

3. Porteus Maze Tests.

By kind permission of Professor Porteus, I have been allowed to reproduce his Maze Tests. Of these the special advantage lies in this: that, whereas the Binet-Simon Tests are almost entirely verbal, and consist of oral answers to oral questions, the Maze Tests are non-linguistic; and so offer a better measure of practical intelligence, neither handicapping the child of poor conversational powers, nor favouring the child who is fluent and glib. They are chiefly of interest in examinations of mentally deficient or temperamentally unstable cases. There are eleven mazes in all, each harder than the last; so that they form an age-scale, constructed upon a principle somewhat akin to that of the more familiar test-series of Binet and Simon.

In difficult cases, where a child's practical capacity seems likely to differ greatly from his intellectual status (for example, children whose attendance at school or interest in school work has been unusually slight), the use of further "performance tests," as they are called, is indispensable. Apart from the Porteus Mazes, the best collection of such tests is that by Pintner and Paterson (*A Scale of Performance Tests*, Appleton and Co., 1917). For these, however, special apparatus is required; and both procedure and norms need revision for English children. An American psychologist is engaged upon the necessary research in London schools; and it is hoped shortly to publish a convenient adaptation.

4. Group Tests.

Group tests, as a rule, are only suited to children above the level of Standard II, *i.e.*, over a mental age of eight. But they are exceedingly serviceable for quick, extensive, preliminary surveys. Such surveys rapidly pick out the apparently bright and the apparently dull, who should then always be examined individually by means of oral tests. No written tests for intelligence are included in this handbook. But, in response to a request received from the London Head Teachers' Association, I hope to reprint the material for Tests 21 to 27 of my original memorandum upon separate sheets suitable for the simultaneous examination of an entire class or school. Booklets of similar group tests for intelligence may now be obtained from the National Institute of Industrial Psychology, 329 High Holborn, W.C.

Interpretation of Results.

When the tests have all been given, the essential element in the interpretation of the results lies in a comparison of the different measurements one with another. The age-basis renders such a comparison instantly possible. And only in this way can special defects be discovered, and their causes treated or removed.

If a child's mental ages for intelligence and for school attainments are both equally below his natural age, he may be deemed dull as well as backward. If school attainments are seriously retarded, while intelligence is normal, he is backward but not dull; and the cause of his backwardness is to be sought in poor attendance, bad teaching, or some defect of character or temperament. If intelligence is slightly retarded, but school attainments more so, then the chief cause may be physical weakness or ill-health.

If the mental age for one subject is greatly below the rest, the child is suffering from some special disability, of which either inappropriate teaching or some special inborn psychological defect (as of memory, visualisation, or the like) may be a probable cause.

The fraction obtained by dividing the child's mental age by his chronological age is termed his "mental ratio." This, as a rule, is approximately constant throughout school life; and hence may be used for purposes of prediction. It is tolerably safe to prophesy that a child who has a mental age of five at seven (and a mental ratio, therefore, of 71 per cent) will have a mental age of about seven at ten, and of about ten at 14 ($71 \times \frac{14}{100} = 10$ approximately); and since natural intelligence does not develop appreciably after this age, he will remain on the level of an average child of ten throughout the remainder of his life. A child whose mental ratio is below 85 per cent. is probably dull and backward; and needs individual teaching in a special class.¹ A child whose mental ratio is below 70 per cent is probably mentally deficient, and should be recommended for the statutory medical examination for admission to a special school. A child whose mental ratio is above 115 per cent, will probably prove suitable for a central school. And one whose mental ratio is above 130 per cent, may be expected, if promptly promoted and properly taught, to gain a junior county scholarship to a secondary school.²

The fraction obtained by dividing the child's educational age by his mental age, may be called his attainment ratio. When this ratio falls much below 100 per cent, the teacher should immediately enquire what is impeding the child's school work and preventing it from keeping even pace with his natural powers of intelligence.

(¹) See *Memorandum on Backward Children*. P. S. King and Son. Price 2s.

(²) The intelligence of supernormal children at higher calendar ages, *e.g.* a boy, who showed a mental ratio of 140 at the age of 9 or 10, but is now reaching the physical age of 12 or 13, can no longer be measured in terms of mental ages and ratio. Some more scientific unit must be adopted—the percentile or the standard deviation. These, however, are technical refinements such as the ordinary teacher can hardly employ.

I. SCHOLASTIC TESTS.

MATERIALS FOR READING, SPELLING AND ARITHMETIC TESTS.

Test 1.

READING (ACCURACY).

Graded Vocabulary Test.

For test material, see over-leaf.

For Instructions, see pp. 271-2. For Norms, see Table XXXIX., p. 399.¹

¹ The references appended to the title of each test are to the larger volume on *Mental and Scholastic Tests*.

Age last
Birthday

4-

to is of at he

my up or no an

10

5-

his for sun big day

sad pot wet one now

20

6-

that girl went boys some

just told love water things

30

7-

carry village nurse quickly return

known journey terror obtain tongue

40

Number
of words

8-	shelves	scramble	twisted	beware	commenced	50
	scarcely	belief	steadiness	labourers	serious	
9-	projecting	fringe	luncheon	nourishment	overwhelmed	60
	urge	explorer	trudging	events	motionless	
10-	economy	formulate	exhausted	contemptuous	renown	70
	universal	circumstances	destiny	glycerine	atmosphere	
11-	perpetual	emergency	humanity	perambulating	ultimate	80
	apprehend	excessively	domineer	theory	reputation	
12-	physician	fatigue	philosopher	melodrama	autobiography	90
	constitutionally	champagne	encyclopedia	hypocritical	efficiency	
13-	melancholy	exorbitant	influential	terminology	palpable	100
	mercenary	contagion	fallacious	binocular	microscopical	
14-	atrocious	phlegmatic	refrigerator	unique	alienate	110
	eccentricity	ingratiating	subtlety	poignancy	phthisis	

Test 2.

READING (LETTERS AND FIGURES).

For Instructions, see pp. 272-3.

O S A X T E M B K
 I C R L P D G N H
 W F U Z V Y J Q

s o a i m e t x f
 c n v h g u b k l
 j r z d y p w q

1 3 2 5 4 8 7 9 0 6 10
 12 18 14 11 13 19 15 17 16 20

26 39 50 74 100 132 576 1,000 1,498 1,927
 10,000 500,000 1,000,000 72,967 8,104,035

$\frac{1}{2}$ $\frac{1}{4}$ $\frac{2}{3}$ $\frac{11}{20}$ $2\frac{5}{8}$ 0·1 2·5 10·001 0·17 6·3

*Test 3.***READING (SPEED ; AND, WITH DEFECTIVES, ACCURACY).****Discontinuous Ungraded¹ Test. Two- and Three-Letter Monosyllables.***For test material, see over-leaf.**For Instructions, see pp. 273-4. For Norms, see Tables XL. and
XLI., pp. 399 and 400.*

(¹) The words are graded for defectives ; **but** for normal children are practically uniform in difficulty throughout.

go	is	at	so	cat	Number of words
to	on	the	we	it	5
he	in	of	my	an	10
up	by	be	and	me	15
do	if	too	dog	as	20
us	you	for	see	am	25
no	or	man	Tom	but	30
ran	ox	not	can	she	35
mat	sun	has	boy	pen	40
box	bat	bad	his	did	45
hat	pig	say	had	wet	50
sat	day	ten	rat	bee	55
run	fox	jam	was	get	60
sit	hot	big	hen	her	65
out	all	men	top	red	70
two	pot	bed	let	pat	75
Sam	fed	fat	leg	got	80
Ned	pin	are	net	one	85
cup	pet	pan	fun	may	90
old	now	who	bit	six	95
					100

sum	saw	pit	cap	hop	Number of words 105
dad	hit	lot	lad	wee	110
ink	sad	set	Bob	off	115
met	egg	nor	fan	cow	120
lip	tea	ill	yet	fit	125
pay	beg	pop	sea	led	130
end	bag	lay	how	put	135
joy	ham	dot	buy	lit	140
far	log	new	fix	way	145
eat	fly	ram	mix	win	150
yes	toy	tin	map	arm	155
bar	our	Jim	hip	hay	160
nut	rag	sin	sow	tub	165
ice	why	ask	car	cry	170
gun	bid	sky	fin	rap	175
rum	bun	jug	fry	sip	180
jar	van	toe	cot	dim	185
jet	tip	wit	rot	mob	190
mew	lap	lie	dig	tap	195
oak	fog	air	vex	ark	200

*Test 4.***READING (COMPREHENSION).****Graded Directions Test.**

For Instructions, see pp. 275-6. For Norms, see Table XLII . p. 400.

Age 5.-

1

Get me a pen.

Age 6.-

2

Put a pin in the box.

3

Give the box to me and sit down.

4

Put two more pins into the box,
and one near it on the table.

5

Lift your hands above your head,
and look at me while I count 5.

5

Pick up the box again ; shake out
the pins ; then give seven pins to
me, holding them in your left hand.

7 I have something in my pocket which I use to tell the time. Do not say what it is called ; but tell me how many hands you think it has.

8 Open my book at page 8. Put the pencil between the leaves of the book. Shut the book. And then say to me : "I have done what you asked."

9 Take this card with you and do all that it tells you. First, go outside the room. While you are outside, change the card into your other hand, and then come back and put the card on the table.

10 " So the shepherd brought his flock to the market ; and the animals were sold to make mutton, after their wool had been cut off to make cloth."

What kind of animals were they ?

11 Turn with your face toward the window before you read the rest of the card. When I tap, walk two steps away from me. When I tap again, raise your empty hand. When I tap the third time, do nothing. At the fourth tap, bring me the card.

Age 8.⁻¹

- 12 Here, she, believe, queen.
Each of these words has the letter "e" in it.
Tell me which contains it the largest number of times.

Age 9.⁻¹

- 13 "The greenest buds of May,
The brightest flowers of June,
To me are never so gay,
As a brown October day,
With its golden sheaves,
And its crimson leaves,
And Autumn tints of decay."

Which month does the writer think the most beautiful—May, October, or June?

Age 10.⁻¹

- 14 Look at the figures below. Cross out every 3 that comes after 4, except when the 4 follows an o.

1 2 3 1 2 4 3 5 4 3 6 7 0 4 1 8 0 4 3 9
7 4 3 1 2 3 0 4 3 4 3 1 2 3 4 5 6 7 8 3

(¹) These headings simply indicate that of the children tested approximately 50 per cent. at the ages specified were able to answer the questions indicated. There are, however, great variations from school to school in the relative difficulty of such questions; and, of course, a single question is not sufficient to decide a mental age. The reasons for appropriating only one question to each of the higher ages are noted *loc. cit.* p. 276.

For the last two questions paper ruled in $\frac{1}{2}$ -in. or $\frac{3}{4}$ -in. squares is used.

Age 11.-¹

15 "Yesterday," said Mrs. Jones, "our cook and the gardener had a race: and to my surprise the gardener won."

"What surprised you?" said Mr. Smith. "Surely you expected the man to beat the woman?"

"Yes," said Mrs. Jones, "but he didn't. You see our gardener is a land girl: and the cook is a Frenchman who used to work in a hotel kitchen."

Mr. Smith laughed. "Of course," he said, "I naturally thought your cook was a , and your gardener a"

Read Mr. Smith's last remark aloud, putting in the missing words.

Age 12.-¹

16 Take the squared paper and the pencil. Place a capital letter O on the fifth square in the top row. Now make a cross in the third square of the next row, unless there are more than six squares in this row, in which case you should write the first letter of your surname in the last square of the third row.

Age 13.-¹

17 Suppose that the blue lines on the paper are streets. With your pencil start from the black mark, and go straight on in the direction of the arrow, until you come to the fourth turning to the right. Go down this, take the third turning to your left and stop at the very next cross road.

(¹) See footnote (¹) on preceding page.

*Test 5.***READING (COMPREHENSION ; ALSO SPEED, ACCURACY, AND
EXPRESSION).****Continuous Prose Test.**

*For Instructions, see pp. 277-283. For Norms, see Tables XLIII. to
XLV., pp. 401-2.*

On his way out of the town he had to pass the prison, and as he looked in at the windows, whom should he see but William himself peeping out of the bars, and looking very sad indeed. "Good morning, brother," said Tom, "have you any message for the King of the Golden River?" William ground his teeth with rage, and shook the bars with all his strength; but Tom only laughed at him, and advising him to make himself comfortable till he came back again, shouldered his basket, shook the bottle of holy water in William's face till it frothed again, and marched off in the highest spirits in the world. It was, indeed, a morning that might have made anyone happy, even with no Golden River to seek for. Level lines of dewy mist lay stretched along the valley, out of which rose the massy mountains—their lower cliffs in pale grey shadow, hardly distinguishable from the floating vapour, but gradually ascending till they caught the sunlight, which ran in bright touches of ruddy colour along the sharp crags, and pierced, in long, level rays, through their fringes of spear-like pine.

Test 5—continued.—READING (Comprehension.)

Continuous Prose Test.

INTERROGATORY.

For Instructions, see p. 282. For Norms, see Table XLV., p. 402.

Order of Question.	Order of Difficulty.	Question.	Answer.
1	3	The story is about two people.	Tom.
2	6	What were their names ? And the name of the other ?	William. (If both names are given in answer to the first question, the reply counts 2 marks.)
3	8	Were they related to one another, or were they only friends ? (If "related" is not understood, repeat question, substituting "Did they belong to the same family ?")	Brothers.
4	1	Where was William ?	In prison. (For "at the window" allow only $\frac{1}{2}$ marks, unless the child can specify that it was a prison window.)
5	15	What did Tom say to William when he first saw him ?	Have you a message for the King ? (For "from the King" allow only $\frac{1}{2}$ mark.)
6	9	How did William reply ?	He was very angry ; or he gnashed his teeth ; or shook the bars.
7	13	Did Tom lose his temper, too ? What did he do ? (If the child replies, "he shouldered his basket," or "he just went on his way," ask, "What did he do first ?")	No. He laughed ; or started taunting or teasing him. (For "no" alone, allow only $\frac{1}{2}$ mark.)
8	18	What else did Tom say to William ?	Make yourself comfortable ; or Wait there till I come back.
9	4	How was Tom feeling that day ?	Happy. Pleased with himself.
10	12	What time of day was it ?	Morning.

READING (Comprehension)—continued.

Order of Question.	Order of Difficulty.	Question.	Answer.
11	2	What kind of weather ?	Bright ; or beautiful ; or misty ; or sunny.
12	19	Where had Tom come from ?	The town.
13	5	What was he setting out to find ?	The Golden River. <i>(If the child replies "the river" or "the King," without being able to specify further, allow only $\frac{1}{2}$ mark.)</i>
14	7	What was he carrying ?	A bottle.
15	11	What else ?	A basket.
16	10	What was in his bottle ? (What kind of water ?)	Holy water <i>(often given in reply to No. 14, in which case the answer scores 2 marks.)</i>
17	17	What did Tom do with the bottle as he left William ?	Showed him the water ; or shook it in his face ; or shook it till it frothed. <i>(No mark for "threw the water at William.")</i>
18	14	What sort of country was Tom walking towards ? What could he see in the distance ?	Mountains ; a valley ; a rocky country.
19	16	Could he see the whole of the mountains very clearly ? Why not ?	No. Because of the mist <i>(or shadow).</i>
20	20	What sort of trees were growing on the edge of the rocks ?	Pines.

Test 6.—SPELLING.

(Graded Vocabulary Test.)

For Instructions, see pp. 287-8. For Norms, see Table XLVI, p. 402

Age.

- 5 — a it cat to and
the on up if box
- 6 — run bad but will pin
cap men got to-day this
- 7 — table even fill black only
coming sorry done lesson smoke
- 8 — money sugar number bright ticket
speak yellow doctor sometimes already
- 9 — rough raise scrape manner publish
touch feel answer several towel
- 10 — surface pleasant saucer whistle razor
vegetable improvement succeed beginning accident
- 11 — decide business carriage rogue receive
usually pigeon practical quantity knuckle
- 12 — distinguish experience disease sympathy illegal
responsible agriculture intelligent artificial peculiar
- 13 — luxurious conceited leopard barbarian occasion
disappoint necessary treacherous descendant precipice
- 14 — virtuous memoranda glazier circuit precision
mosquito promiscuous assassinate embarrassing tyrannous

Test 7.—DICTATION (Continuous Graded Test.)

For Instructions, see pp. 288–290. For Norms, see Table XLVII., p. 403.

	No. of Letters
It is on a cat, but not a dog.	(20)
I saw her run by in the wet.	(40)
She came to seek or steal	(60)
a bird's nest in the grass—	(80)
the cruel little kitten !	(100)
 I have asked forty girls	(120)
this puzzle. None failed	(140)
Imitate their industry.	(160)
Explain every sentence.	(180)
Employ beautiful style.	(200)
 Should your solution be	(220)
satisfactory, I believe	(240)
thoroughly acceptable	(260)
prizes will be bestowed,	(280)
designed for either sex—	(300)
 pianos, sewing machines,	(320)
ingenious model yachts,	(340)
forfeited photographs,	(360)
excellent bicycles for	(380)
picturesque adventure,—	(400)
 an emphatic sign,	
genuine if miscellaneous in character,	
of our conscientious appreciation	
of your unique proficiency.	(500)

ARITHMETIC.

Graded Oral Test : Mental.

[Test 8.]

For Instructions, see pp. 296-8. For Norms, see Table XLVIII., p. 403

Below the Educational Age of 4-.

For children at the lowest mental levels, *e.g.*, defectives of a mental age of 3-, and young normals who have never been to school, exercises of the following types may be recommended to test their "sense of number":

1. Show the child 1, 2, 3 or more fingers : ask him to do the same.
2. Show the child 3 or more beads, (a) arranged in some simple pattern like the pips upon a domino, (b) arranged in a single line (much harder) : ask him to pick out the same number.
3. Show the child a given number of beads, and ask him to hold up the same number of fingers ; and *vice versa*.
4. Try the same exercises through other sensory channels : *e.g.*, make him reproduce a given number of taps on the table, of taps on his own hand, of rhythmic movements impressed upon his arm—the child's eyes being shut.
5. Make him repeat after you the numbers in order—*e.g.*, "1, 2, 3"—progressively increasing the length of the series.
6. Ask him to name without counting small numbers of fingers, beads, taps, etc. ; and to compare without counting the size of larger but unequal groups ("which is the bigger ?")
7. Make him count aloud, pointing with his finger, larger number of objects, arranged in rows.
8. Make him arrange beads in a row in a definite and recurrent order according to colour : *e.g.*, 1 red, 3 blue, (2 yellow), 1 red again, and so on.
9. Make him build up 2 groups ("one for you and one for me") containing a given number of beads in each.
10. Make him divide a given heap of (say) 6 beads into 2 (or 3) equal groups.

Age 4-.¹

1. How many fingers do I hold up ? (Showing 2.)
2. If I hold up one more, how many will there be ?
3. Count how many fingers there are now. Count them with your finger. (Holding out four with each hand.)
4. Let me hear how far you can count—one, two, three, (To pass, should recite the cardinal numbers to 10 at $4\frac{1}{2}$ years, to 19 at $5\frac{1}{2}$, to 21 or beyond at $6\frac{1}{2}$ or above.)²

(¹) The ages by which the earliest and latest sets of questions are denominated are convenient and conventional rather than exact. Tests below the age of 4- are not included in the totals given in the tables

(²) The higher ages refer primarily to chronological ages of backward and defective children

5. If you had 3 pennies in this hand, and then I gave you 1 more, how many would you have altogether ? (Hold out the child's hand that he may visualise the money.)

6. Suppose you had 2 pennies, and lost 1 : how many would you have left ?

7. How many are 7 and 1 more ?

8. How many halfpennies would you want to buy a penny bun ?

9. Two and two more ?

10. If I gave you 3 sweets and you ate 2, how many would you have left ?

Age 5-.

1. If you had 5 nuts and gave 1 away, how many would be left for yourself ?

2. If you had 3 beads in this hand and 2 beads in this one, how many would that be altogether ?

3. Take 2 from 4. How many would be left ?

4. How many halfpennies are there in a penny and a halfpenny ?

5. What are twice 2 ?

6. How many farthings would you want to buy a penny ball ?

7. 5 and 2 more. How many is that ?

8. Four boys have given me a halfpenny each. How many pennies is that worth ?

9. I once had 4 pet mice in a cage. One died : one ran away : and one was eaten by the cat. How many were left ?

10. A boy caught 4 fish on Friday and 3 on Saturday. How many fish did he catch altogether ?

Age 6-.

1. How many do 6 and 3 make ?

2. What are 5 two's ?

3. Take 5 pence from 7 pence. How much would be left ?

4. How many ears are there on 3 donkeys ?

5. How many farthings are there in 2d. ?

6. Write down (in figures) 35.

7. How much is one half of 4 ?

8. I have 3 pockets and 3 apples in each. How many is that altogether ?

9. I put 2d. in my money-box every morning before I go to school. How many pennies shall I have saved in 3 days ?

10. I had 9 eggs in a basket, and smashed 3. How many were left ?

Age 7-.

1. My brother has picked 6 nuts, my sister has picked 10, and I have picked 18. How many have we got altogether ?

2. 12 girls have a farthing each. How many pennies is that ?

3. How many $\frac{1}{2}$ d. stamps can I buy for 9d. ?

4. I started with 14 marbles, and I have won 26. How many have I now ?

5. I have 2s. to divide among 4 children. How much should each have if all are to have the same amount ?
6. How many days are there in 6 weeks ?
7. My brother is 4 ft. high. How many inches is that ?
8. On a tram there were 50 people who each paid 1d. fare. How much (in shillings and pence) did the conductor take altogether ?
9. If treacle were 8d. a pound, how much would $\frac{3}{4}$ lb. cost ?
10. Yesterday we went blackberrying. I picked 21 berries, and my brother ate 12 of them. How many were left ?

Age 8-.

1. A boy had 20 marbles. Afterwards he won 3 and lost 5. How many had he then ?
2. How many penny stamps can I buy for 7s. ?
3. Mother gave me $2\frac{1}{2}$ d. Father gave me twice as much. How much have I altogether ?
4. I have 22 farthings in a bag. How many pennies is that worth ?
5. In an infants' school there were 99 boys and 60 girls. How many more boys than girls were there ?
6. Norton is 36 miles away. What would the fare be at 1d. a mile ?
7. Tommy collected 32 tram tickets. 18 are white, and the rest are pink. How many pink ones has he ?
8. How many beans must be taken from 47 to leave only a dozen ?
9. I have an empty album that will hold 100 picture post-cards. I have been to 6 different towns during my holiday, and at each I bought ten picture post-cards. How many more must I collect to fill the album ?
10. Add together a farthing, a halfpenny, a sixpence, a shilling, and half-a-crown.

Age 9-.

1. Jack weighs exactly 100 lbs. His sister weighs 81 lbs. How much heavier is Jack ?
2. I have been for a week's holiday. I spent 6d. a day while I was away. How much should I have left out of 4s. ?
3. I bought 9 penny stamps and 7 halfpenny ones. How much change should I have from 2s. ?
4. When oranges were 2 a penny, how many could I buy for half-a-crown ?
5. Tom had 31 sweets. And 9 boys have each given him 7 more. How many has he altogether ?
6. I had 12s. and I have spent 5s. $11\frac{1}{2}$ d. How much have I left ?
7. How many ounces are there in $1\frac{3}{4}$ lbs. ?
8. My bookshelf is $3\frac{1}{2}$ ft. long. How many books will it hold if each is 1 inch thick ?
9. Share 1s. 3d. equally among 10 boys.
10. I have cut 1 ft. of tape into pieces $1\frac{1}{2}$ ins. long. How many pieces have I made ?

Age 10-.

1. I get 6d. an hour and I work 8 hours a day. How much can I earn in 5 days ?
2. If apples were 4 for 3d., how many could I buy for 3s. ?
3. I must be at the station a quarter of an hour before my train starts. It starts at five-and-twenty to one. When should I be there ?
4. My brother was born in 1899. How old will he be in 1930 ?
5. Take 100d. from £1. How much is left in shillings and pence ?
6. I bought 10 pairs of boots at the rate of a guinea for a single boot. How many pounds did the 10 pairs cost ?
7. What is the difference between one-half and one-quarter of £8 8s. 8d. ?
8. I posted a penny post-card every day in January. How much did the postage amount to ?
9. My brother is 21 years old. I was born when he was 10. Add both our ages together.
10. What would be the total postage for 9 letters, 9 post-cards, and 9 circulars at $1\frac{1}{2}$ d., 1d., and $\frac{1}{2}$ d. respectively ?

Age 11-.

1. Write down $2\cdot25$ as a vulgar fraction in its lowest terms.
2. A servant earned £26 a year wages. How much was that a week ?
3. How much is seven-tenths of half-a-crown ?
4. Divide 15s. $5\frac{1}{2}$ d. by 7.
5. How many minutes from $\frac{1}{4}$ past 6 to $\frac{1}{4}$ to 8 ?
6. A man walked 2 miles in 30 minutes. How many hours would 20 miles take him ?
7. How many months will there be between 1st January, 1920, and 31st December, 1924 ?
8. My neighbour drinks $\frac{1}{2}$ pint of cider at dinner and $\frac{1}{2}$ pint at supper. How long will a 7-gallon cask last him at that rate ?
9. If 3 glasses cost $4\frac{1}{2}$ d., how many can I get for 2s. ?
10. How many words are there in a book of 100 pages, at 20 lines to a page and 10 words to a line ?

Age 12-.

1. What fraction of £1 is a third of 1s. ?
2. A wall is 30 ft. long and 4 ft. high. How much would it cost to whitewash it at $\frac{1}{2}$ d. a square foot ?
3. The church door is 50 ft. away, and I step $2\frac{1}{2}$ ft. In how many steps can I get to the church ?
4. 129 rackets at 5/- each ?
5. How many lbs. and ozs. in $\cdot75$ of 2 lbs. ?
6. A man bought 100 oranges for 5s. 16 were bad. He sold the rest at a shilling a dozen. How much profit did he make ?

7. I bought a football for 12/- and sold it for 15/-. What was my gain per cent. ?

8. What is the shortest length of silk from which I can cut off either 4 inches, 6 inches, or 8 inches an exact number of times ?

9. Divide 3/- among 2 boys so that one has 8d. more than the other.

10. How many pieces of a foot and a quarter can I cut from 5 yds. ?

Age 13-.

1. What is the average of 6 inches, 7 inches, 9 inches, and 1 ft. ?

2. A motor goes 3 times as fast as a horse. The horse goes 36 miles in 6 hours. How long will it take the motor ?

3. Simple interest on £300 for 3 years at 5 per cent. ?

4. $4\frac{1}{2}$ ozs. at $2/8$ per lb. ?

5. 3 boys can eat a pudding in 10 minutes. How quickly can 12 boys eat it ?

6. How many times is one-sixth contained in $13\frac{1}{2}$?

7. What is $2\frac{1}{2}$ per cent. on £4 ?

8. My little garden is 7 yds. square ; my sister's is 5 yds. square. By how many square yds. is mine bigger than hers ?

9. How many sq. yds. of paper will just cover a table 6 ft. long and 3 ft. broad ?

10. Multiply $\cdot 5$ by $2\cdot 4$ and divide by 3.

Age 14-.

1. How many labels $2\frac{1}{2}$ in. by 2 in. are needed to cover a sheet 10 in. square ?

2. If a train goes 30 miles in $1\frac{1}{2}$ hours, how far will it travel in $4\frac{1}{4}$ hours ?

3. If 6 men do a piece of work in 15 days, how many men must I employ to get it done in 10 ?

4. A blackboard is 3 ft. broad and 4 ft. long. How many inches of wire would just go round the edge ?

5. One-third of my stick is in the water ; one-quarter is in the mud ; 15 inches is above the water. How long is the stick ?

6. Add the cube of 5 to the square root of 121.

7. I want to cover these square boxes or cubes completely with gold paper. How many sq. yds. shall I need ? There are 3 boxes ; and each edge measures 2 ft.

8. In what proportion must rice at 7d. a lb. be mixed with rice at 4d. a lb. to make the mixture worth 5d. a lb. ?

9. My father is 45 years of age, and I am 21. At what age was my father 3 times as old as I ?

10. If 2 hens lay 2 eggs in 2 days, how many eggs will 6 hens lay in 6 days ?

ARITHMETIC (Written Graded Test : Mechanical.)

[Test 9.]

For Instructions, see pp. 298-300. For Norms, see Table XLIX, p. 404.

Age 7-.

1. $\begin{array}{r} 21 \\ 37 \\ 18 \\ 36 \\ \hline \end{array}$

2. $61 - 38.$

3. $953 \times 4.$

4. $2s. 1d. + 1s. 3d. + 10d.$

5. $1s. 5d. \times 3.$

Age 8-.

1. $\begin{array}{r} 9687 \\ 1209 \\ 834 \\ 3620 \\ 2175 \\ \hline \end{array}$

2. $5 \overline{) 1085}$

3. From £9 15s. $9\frac{1}{2}d.$

Take £3 17s. $5\frac{1}{4}d.$

4. $\begin{array}{r} \text{£} \quad \text{s.} \quad \text{d.} \\ 1 \quad 18 \quad 4\frac{1}{4} \\ 3 \quad 9 \quad 6\frac{1}{2} \\ 2 \quad 5 \quad 7\frac{3}{4} \\ 3 \quad 4 \\ \hline \end{array}$

5. $\text{£}1 \ 13s. \ 5d. \times 3.$

Age 9-.

1. From $9,084\frac{1}{4}$ take $3,597\frac{1}{2}$.

2. $\begin{array}{r} \text{£} \quad \text{s.} \quad \text{d.} \\ 42 \quad 16 \quad 7\frac{1}{4} \\ 3 \quad 19 \quad 8\frac{1}{2} \\ 18 \quad 7 \quad 4\frac{3}{4} \\ 25 \quad 10 \quad 11 \\ \hline \end{array}$

3. $98,467 \div 84$.
4. *Bill.* $1\frac{1}{2}$ lbs. of Butter at 1/- per lb.
Milk for one week at 2d. per day
2 doz. Eggs at $1\frac{1}{2}$ d. each.
5. How many farthings in £2.17s. $6\frac{1}{2}$ d. ?

Age 10-

1. $2233\cdot6 \div 8$.
2. £61 13s. $7\frac{3}{4}$ d. $\times 64$.
3.

yds.	ft.	in.
35	2	$11\frac{3}{4}$
8	1	$9\frac{1}{2}$
12	0	$7\frac{1}{4}$
73	2	$5\frac{1}{4}$

4. How many pounds in 1 ton 6 cwt, 0 qr. 0 st. 3 lbs. ?
5. $\frac{1}{10} + \frac{1}{5} + 8\cdot5 - 0\cdot2$.

Age 11-

1. If 14 yds. of calico cost 5s. 3d., what is the cost of 35 yds. ?
2. $5\cdot281 \times 0\cdot047$.
3. $2\frac{7}{15} + 1\frac{2}{21} + \frac{1}{35} - \frac{12}{105}$.
4. Express $\frac{2}{9}$ of 7s. 6d. as a fraction of £1.
5. Find the value of 3 tons 10 cwt. 2 qrs. at £5 10s. 0d. per ton.

Age 12-

1. If it takes 16 men 28 days to do a piece of work, how long will it take 21 men to do it ?

2. Simplify
$$\frac{4236\cdot4 \times \cdot008}{1\cdot0591}$$

3. Find the L.C.M. of 48, 28, 50, 51.
4. Find the simple interest on £560 for 22 years at $2\frac{3}{4}$ per cent.
5. Find the sum of 1·7 of 5 lbs. + 3·75 of 1 lb. 4 ozs.

Age 13-

1. Simplify
$$\frac{\frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6}}{2\frac{5}{6} - 1\frac{5}{6}}$$

2. Find the average of 2 tons 6 cwt. 3 qrs. 3 lbs., 3 tons 17 cwt. 2 qrs. 7 lbs., $2\frac{1}{2}$ tons, $15\frac{3}{4}$ cwt., and 1·125 tons.
3. An article which cost £33 6s. 8d. was sold for £37 10s. 0d. What was the gain per cent. ?
4. At what rate per cent. will £306 5s. 0d. produce £1 0s. 5d. per month ?
5. Find the cost of papering a room 30 ft. long, 25 ft. wide, and 12 ft. 6 in. high with paper 1 ft. 6 ins. wide at 10d. per yard.

Age 14-.¹

1. The following table gives the sums assessed for Income Tax for the last five years of the last century. Find the totals for the several years.

Years	Land and Houses	Business	Investments	Salaries	Totals
1895-6	145,917,380	271,768,638	36,394,180	33,878,682	—
1896-7	147,329,579	284,400,461	36,127,937	35,806,653	—
1897-8	148,146,174	303,598,980	35,966,088	37,499,958	—
1898-9	153,110,123	318,555,003	36,703,116	39,861,208	—
1899-1900	153,875,858	332,149,361	36,165,000	42,678,520	—

2. Which is the greater, and by how many grams—a thousand kilograms or $\frac{4}{5}$ of a ton ?
[1 gram = .035 ounce.]

3. Make out the following contractor's bill, deducting 5 per cent. discount :

To 300,000 bricks at 35s. per 1000.

„ 240 tons lime at 25s. per ton.

„ 670 yd. gravel at 12s. 6d. per yd.

„ 250 yd. sand at 17s. 6d. per yd.

„ cartage lime at 1s. 6d. per ton.

„ „ sand and gravel at 9d. per yd.

4. Find, to the nearest penny, the difference between the Simple and the Compound Interest on £6310 15s. 0d. for 3 years at 4 per cent. per annum.

5. The area of a square is 1722.25 sq. ft. Find (in yards, feet, and inches) the length of the side.

ARITHMETIC (Written Graded Test : Problems).

[Test 10.]

For Instructions, see pp. 298-300. For Norms, see Table L., p. 404.

Age 7-.

1. There are 7 oranges in my basket, 11 in yours, and 9 in Jack's. How many are there altogether ?

2. I have 12 apples. How many more must I buy to make 20 ?

3. How many legs are there on 9 sheep ?

4. 12 Germans attacked us. We shot 6; and 2 ran away. How many were left to be taken prisoners ?

5. Share one shilling equally among 6 children. How much would each have ?

Age 8-.

1. This strip of tape is 1 ft. 4 ins. long. How many inches can I cut it up into ?

2. I have just smashed 17 eggs; and have 43 left. How many dozen did I have to begin with ?

3. How many sixpenny pop-guns can I buy with four shillings and six pence ?

4. I have bought a cake for 1s. 2d., and some jam for 5d. How much change ought I to have out of 3 shillings ?

5. In the front of my house there are five windows, with nine panes in each. Some boys have broken several panes. Thirty are left unbroken. How many want mending ?

(¹) The age assigned to these problems is purely conventional, and is intended merely to mark a further year's instruction in arithmetic beyond the stage of age 13- (Standard VII).

Age 9-.

1. I have lost a purse containing a pound note, 3 ten-shilling notes, half a crown, 4 sixpences, and 9 halfpennies. How much have I lost altogether ?

2. If I can buy two pounds of red paint for 6d., how much shall I pay for 7 lbs. ?

3. On Fido's grave we raised a mound of stones. Mother put 50 pebbles, and my six brothers and I put 11 each. How many stones were there in the heap ?

4. Mary had 3 times as much money as John. John had sixpence more than Harry. Harry had half a crown. How much had they altogether ?

5. My wife and I have just bought tickets for Liverpool. How much change have we left out of a five-pound note ? (Fare to Liverpool, 32s. 6d. each.)

Age 10-.

1. Tom had 13s. 9d., Jack had 6s. 11d., and Nellie had 17s. 7d. With this money they bought their mother a present, and received 2s. 6d. back as change. What did the present cost ?

2. Altogether there are 34 medals in these two boxes. One contains 8 more than the other. How many are there in each box ?

3. The King left Windsor at 10 minutes past 10 this morning, and reached London at a quarter to twelve. How long did the journey take him ?

4. I have just bought 3 jars of raspberry jam at $1/1\frac{1}{2}$ a jar ; $3\frac{1}{2}$ lbs. of butter at $1/2$ per lb. ; 5 lbs. of tea at $1/10$ per lb. ; 7 lbs. of sugar at $2\frac{1}{2}$ d. per lb. How much have I left out of £2 ?

5. How high is the floor of my room from the ground floor of the house ? There are 14 steps on the staircase leading up to it, and each step rises $6\frac{1}{2}$ inches.

Age 11-.

1. In 1916 the Germans and Austrians had at least 2,600,000 fighting against Russia, 1,800,000 fighting against France, England, and Belgium, and 400,000 fighting against Italy. Let us suppose that altogether they had 6,000,000 available as soldiers. How many were left to be called up later on ?

2. A postman told me this morning that he walked 19 miles a day for 6 days a week and 8 miles on Sunday. How many miles will he walk in a year ?

3. Write down the figures 789 in every possible way : 789, 798, etc., and add up the total.

4. A rich and a poor girl live together and pay 17s. 6d. per week for their room. The rich girl agrees to pay twice as much as the poor girl. How much does each pay ?

5. If an aeroplane can fly from here to Norton in 45 minutes, how long would it take to fly to Easton and back without stopping ? (Distance to Norton, 40 miles ; to Easton, 18 miles.)

Age 12-.

1. A statue in plaster of Paris weighed 6 stns. 6 lbs. when it was completely dry. In drying, plaster of Paris loses water to the extent of three-fifths of its weight. What was the original weight of the statue when soft and wet ?

2. How many penny stamps will just cover a sheet of foolscap paper ? (A sheet of foolscap measures $12\frac{3}{4}$ in. by 8 in. ; a penny stamp is 1 in. by $\frac{3}{4}$ in.)

3. The average age of 6 children is 14 years 8 months. The oldest is 18 years old. What is the average age of the remainder ?

4. Under the National Insurance Act Mrs. Smith received a sickness benefit of 7s. 6d. a week for 26 weeks, and afterwards a disablement allowance for 5 years 2 months at 5s. per week. What was the total amount received ?

5. A soldier's step is $2\frac{1}{2}$ ft. At quick march he takes 108 steps per minute. How far could he march in 3 hours ?

Age 13-.

1. Mr. Miles' classroom is 24 ft. long, 17 ft. 6 ins. wide, and 10 ft. high. By the regulations each child must have on an average at least 100 cubic feet of air space. How many children can he accommodate ?

2. If a frog spends 15 per cent. of its time in the water, and lives to the age of 16 years, how many days does it spend on land ?

3. How many hours do you spend at lessons in one term of 13 weeks ? (Lessons from 9.15 a.m. to 12 noon in the morning, and from 2.10 to 4.25 in the afternoon, with ten minutes' play in the morning and ten minutes' play in the afternoon.)

4. How long will it take an English cruiser steaming at $\frac{1}{2}$ mile per minute to overtake a German battleship 10 miles ahead of her, if the battleship steams at $\frac{1}{4}$ mile per minute ?

5. The foreman earns 32s. per week and his two assistants 25s. per week each, and the 10 men under him earn 16s. per week each. What is the average wage expressed as the decimal of £1 ?

*Age 14-.*¹

1. Last week I burnt 12 tons of coal at 64s. a ton. I then bought a large quantity of coke at 48s. a ton, and mixed it with the remainder of the coal in the proportion of 3 parts coke to 5 parts coal. I find I use only 11 tons a week of the slow-burning mixture. How much money a week am I saving by this method ?

2. A cube of marble whose edge is $1\frac{1}{2}$ ft. in length is lowered to the bottom of a deep rectangular tank, 5 ft. 6 in. long and 4 ft. 3 in. broad. The tank is part of a fountain, and is usually about half full of water. How much was the surface of the water raised by the complete immersion of the stone ?

3. Last July the average temperature from the 9th to the 16th (including both these days) was 65.8° ; and from the 10th to the 17th (including both these days) it was 67.5° . On July 9th it was 65° . What was it, therefore, on July 17th ?

4. Travelling from Aytown to Extown, 40 miles away, a man ran his car at 20 miles per hour. At Kewtown he stopped for 10 minutes for more petrol; and at Veetown, 5 miles further on, he had to return to Kewtown for a pump he had forgotten. At what steady speed would he have to return from Extown to Aytown (without any stoppages) to take the same time coming back as he did going ?

5. From a cistern which is $\frac{5}{8}$ full 300 litres of oil leak away. 700 litres are then added, and the cistern is found to be $\frac{7}{8}$ full. How many gallons will it hold ? [1 gallon = 4.54 litres.]

(¹) See note, page 25.

ARITHMETIC (Written Ungraded Tests).

[Tests 11 to 14].

Four Fundamental Rules.¹*For Instructions, see pp. 301-2. For Norms, see Tables LI.-LIV., pp. 405-6*

Test 11. (i) ADDITION.

9 2	4 5	3 6	8 4	4 6	2 3	7 8	9 6	3 4	6 2
2 7	3 7	9 3	7 8	9 2	6 4	2 3	8 9	6 2	5 9
5 4	9 8	5 2	5 3	7 9	5 8	9 2	6 8	5 9	7 7
9 5	7 6	3 4	6 9	4 8	2 5	3 5	7 4	8 6	8 6
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7 6	3 8	2 5	8 3	9 7	7 9	2 7	4 5	7 9	9 5
9 8	5 9	3 6	5 2	5 8	6 4	5 4	7 9	5 3	6 3
5 3	9 7	8 3	6 7	4 6	5 3	6 9	6 2	6 8	3 9
4 8	4 5	9 5	8 9	8 5	7 6	2 5	9 6	3 7	4 2
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

8 5	4 6	8 9	3 5	2 5	6 7	5 9	5 4	9 4	3 6
6 8	5 7	4 7	8 4	4 2	7 2	3 2	2 9	3 7	4 5
2 4	8 4	2 4	4 2	3 7	9 6	8 5	3 6	6 8	8 4
7 3	3 9	9 7	2 3	2 2	5 3	7 7	9 8	5 9	4 2
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

5 3	8 7	4 9	5 4	7 9	5 2	7 2	2 3	5 8	8 2
4 5	9 6	8 6	6 3	4 8	7 4	8 3	9 8	9 6	3 6
3 7	2 8	7 5	8 6	2 5	8 9	4 6	3 9	2 5	4 7
8 4	6 3	9 3	5 2	5 9	6 4	5 9	6 7	3 4	9 8
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

6 9	5 8	6 7	9 7	3 4	9 2	4 3	6 8	6 8	2 3
2 5	8 7	8 9	4 5	2 5	7 5	2 6	9 5	3 4	7 9
9 2	3 2	7 5	7 3	7 3	4 6	9 5	4 9	2 5	9 4
8 7	5 9	2 6	5 2	6 4	3 7	6 8	7 3	4 2	2 8
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
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⁽¹⁾ The test-sheets, printed for the children, should, of course, be set up in type considerably larger than the above,—12 point at least, with modern face.

Test 12. (ii) SUBTRACTION.

9802 6246 -----	7721 1841 -----	4944 1295 -----	3208 1738 -----	5831 3676 -----
8781 5795 -----	8079 4599 -----	3253 2195 -----	5106 2892 -----	8756 3569 -----
9653 3873 -----	7634 4648 -----	7812 3178 -----	5014 1694 -----	4952 2889 -----
7206 2321 -----	6265 3575 -----	9231 1282 -----	9843 1769 -----	9136 7465 -----
6403 4318 -----	9405 5784 -----	9107 4376 -----	5822 1893 -----	7029 3372 -----
5701 2694 -----	8502 3742 -----	9640 5481 -----	4438 1572 -----	3402 1425 -----
7109 4263 -----	7916 2958 -----	5039 3748 -----	6054 2863 -----	8518 1599 -----
6835 3469 -----	6257 1687 -----	7364 5379 -----	4678 2987 -----	8670 6595 -----
9346 1966 -----	8212 5831 -----	7531 1457 -----	9213 6482 -----	9114 4167 -----
3952 2898 -----	8065 6574 -----	9703 6549 -----	9427 2796 -----	6681 4696 -----

Test 13. (iii) MULTIPLICATION.

2 4 9 8 2 _____ _____	7 5 2 8 3 _____ _____	9 4 8 2 4 _____ _____	3 5 7 4 5 _____ _____	2 6 3 8 6 _____ _____
8 2 6 5 7 _____ _____	9 5 8 7 8 _____ _____	5 7 6 3 9 _____ _____	6 7 5 3 4 _____ _____	3 7 4 9 7 _____ _____
7 5 4 9 6 _____ _____	2 9 6 8 5 _____ _____	3 4 6 9 3 _____ _____	4 9 2 8 9 _____ _____	3 7 5 6 2 _____ _____
2 6 3 4 8 _____ _____	5 6 8 9 2 _____ _____	5 3 9 2 4 _____ _____	7 6 2 9 5 _____ _____	8 5 2 7 8 _____ _____
8 7 5 6 6 _____ _____	3 9 5 7 6 _____ _____	7 6 5 9 9 _____ _____	4 5 9 3 3 _____ _____	4 3 9 2 7 _____ _____
3 5 4 8 5 _____ _____	4 8 2 3 9 _____ _____	6 8 7 4 4 _____ _____	6 4 2 8 6 _____ _____	3 2 7 4 2 _____ _____
7 2 8 6 3 _____ _____	4 9 3 6 8 _____ _____	2 8 4 7 5 _____ _____	5 9 2 8 9 _____ _____	8 4 9 3 3 _____ _____
9 6 2 7 7 _____ _____	8 6 3 4 4 _____ _____	3 5 8 7 6 _____ _____	3 6 4 7 8 _____ _____	6 8 5 2 2 _____ _____
5 9 2 7 4 _____ _____	7 4 6 3 9 _____ _____	5 3 6 9 5 _____ _____	4 6 9 2 6 _____ _____	8 2 9 5 8 _____ _____
7 4 9 3 2 _____ _____	3 4 5 8 7 _____ _____	5 2 6 7 3 _____ _____	2 9 3 8 6 _____ _____	4 7 5 6 4 _____ _____

Test 14. (iv) DIVISION.

2)16738	3)13749	4)33500	5)47670	6)44568
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

7)60844	8)53832	9)57168	3)22887	8)66760
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2)14850	9)43182	7)52045	4)38492	6)39234
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

5)34135	3)17796	9)66141	6)31722	8)27832
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

7)37086	5)21475	4)26156	2)12494	5)18930
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

2)19670	7)26348	3)23592	9)77868	4)19488
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

8)46608	6)56184	7)32151	8)67936	6)37710
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

9)70668	4)38608	3)11874	5)16340	2)15186
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

3)19281	8)61080	6)44634	2)16492	9)84924
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

4)26936	7)43946	5)47285	4)11752	6)28536
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

II. INTELLIGENCE TESTS.

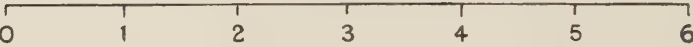
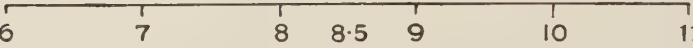




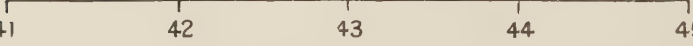
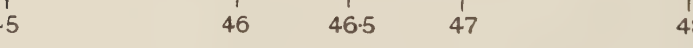

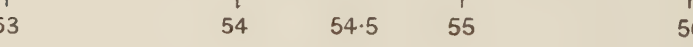


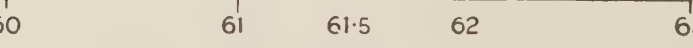

MATERIALS FOR BINET-SIMON, REASONING, AND PORTEUS
MAZE TESTS.

TABLE I.

Binet-Simon Tests.

KEY FOR CONVERTING TEST-SCORES INTO MENTAL AGES.

Fractions of a Year.

YEARS	Fractions of a Year.												YEAR to which tests are assigned
	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9	1.0		
	$\frac{0}{12}$	$\frac{1}{12}$	$\frac{2}{12}$	$\frac{3}{12}$	$\frac{4}{12}$	$\frac{5}{12}$	$\frac{6}{12}$	$\frac{7}{12}$	$\frac{8}{12}$	$\frac{9}{12}$	$\frac{10}{12}$	$\frac{11}{12}$	
SCORE IN TERMS OF TESTS													
2.													III
3.													IV
4.													V
5.													VI
6.													VII
7.													VIII
8.													IX
9.													X
10.													XI
11.													XII
12.													XIII
13.													XIV
14.													XV
15.													XVI

To face page 35.

Explanatory Note to Table I.—To find a child's mental age, look among the figures in the body of the table for the total number of tests passed (both actually and by implication); say, 40. The figure on the same horizontal line in the left-hand margin gives the year (7...), and the figure immediately above in the top margin gives the additional fraction of a year (...·8), corresponding to the test-score. The mental age, therefore, for a child who has passed 40 tests is 7·8.

Conversely, to find the number of tests a child should pass at a given calendar age, say $11\frac{4}{2}$, look first down the left-hand margin for the year, and then along the lower row of fractions in the upper margin for the months. Imaginary straight lines drawn horizontally and vertically from the two numbers will intersect in the body of the table near a figure which will show the number of tests that should be passed, namely 54.

SCHEDULE I.

Sample Record Form.

(List of Binet-Simon Tests in average order of difficulty with revised age-assignments.)

Name of Child Age..... Born.....
School..... Standard Date of Test

Number of Test.	Border-line.	Scale.	Tests.	Success of Response.
			AGE III.	
			(Children aged 2 to 3 should do half the following tests.)	
1			Points to nose...., eyes...., mouth....	
2			Repeats 2 numbers (1 trial correct out of 3): 3 7...., 6 4...., 7 2....	
3	$3\frac{1}{2}$		Knows sex. Boy or girl (if boy).... Girl or boy (if girl)....	
4			Gives name...., and surname....	
5			Names knife...., key...., penny....	
6			Pictures. Enumerates items in 2 out of 3: (i).... (ii).... (iii)....	
			AGE IV.	
			(Children aged 3 to 4, or in grade 0, should do half the following tests.)	
7	$4\frac{1}{2}$		Repeats 6 syllables: "I am cold and hungry"	
8			Repeats 3 numbers (1 trial correct out of 3): 9 1 4...., 2 8 6...., 5 3 9....	
9			Counts 4 pennies....	
10	$5\frac{1}{2}$		Points to longer of 2 lines (5 and 6 cm.); all trials correct....	
11			Points to prettier faces. (All 3 pairs correct.) 1st...., 2nd...., 3rd.... pair.	

Number of Test.	Border-line.	Scale.	Tests.	Success of Response.
AGE V.				
(Children aged 4 to 5, or in grade I., should do half the following tests.)				
12			Performs triple order: (i) Key on table...., (ii) shuts door...., (iii) brings book....	
13			Copies square recognisably....	
14			Repeats 10 syllables: "His name is Jack; he's such a naughty dog."	
15		'08	Gives age....	
16	6½		Distinguishes morning and afternoon (if morning)....; <i>vice versa</i> if afternoon....	
17			Names 4 colours (in about 6 secs.: no error or second trial): B...., Y...., G...., R....	
18		neither	Repeats 4 numbers (1 trial correct out of 3): 3 6 8 1...., 5 7 4 9...., 8 5 2 6....	
19			Compares 2 weights (all trials correct except first random): (i) 3 and 12 g.... (ii) 6 and 15 g.... (iii) 3 and 12 g.... Procedure :	
AGE VI.				
(Children aged 5 to 6, or in grade II., should do half the following tests.)				
20		'08	Knows (without counting) number of fingers on right hand...., left hand...., both	
21			Counts 13 pennies....	
22			Copies diamond recognisably....	
23	7½	'08	Copies from script (legibly, but errors allowed): "See little Paul"	
24		'08	Names days of week without error in 10 secs. M...., T...., W...., Th...., F...., S...., Su....	
25		'08	Names without error 4 coins: 1s...., 1d...., 6d...., ½d....	
26			Reconstructs divided oblong card (in about ½ min.) Procedure :	
27			Defines by use (3 out of 5): (i) horse, (ii) chair, (iii) mother, (iv) table, (v) fork	
28			Repeats 5 numbers (1 trial correct out of 3): 5 2 9 4 7...., 6 3 8 5 2...., 9 7 3 1 8....	
29			Pictures. Describes items in 2 out of 3: (i)...., (ii)...., (iii)....	
30		'08	Repeats 16 syllables: "We are going for a walk; will you give me that pretty bonnet?"	
31	8½		Shows right hand....; left ear....	

Number of Test.	Border-line.	Scale.	Tests.	Success of Response
AGE VII.				
(Children aged 6 to 7, or in grade iii., should do half the following tests.)				
32			Recognises missing features (3 out of 4): (i) mouth...., (ii) eye...., (iii) nose...., (iv) arms....	
33			Adds without error 3 pennies and 3 half-pennies (in 15 secs.)....	
34	9½		States differences between concrete objects (2 pairs out of 3 in 2 mins.): (i) fly—butter-fly, (ii) wood—glass, (iii) paper—cardboard	
35		'08	Writes from dictation (legibly, but errors allowed): "The pretty little girls."	
AGE VIII.				
(Children aged 7 to 8, or in standard I., should do half the following tests.)				
36		'08	Reads, without assistance, passage prescribed; and recalls 2 items out of 20items.	
37	10½		Answers easy questions (2 out of 3): What would you do,—(i) if missed train...., (ii) if broke something...., (iii) if struck accidentally....	
38			Counts backwards from 20 to 1 (in about 30 secs., with only 1 error)....	
39			Gives full date. Day of week...., day of month (3 days error allowed)....., month, year....	
40			Gives change for 2d. out of 1s. (coins to necessitate silver). Money given:pennies,halfpennies,sixpence,other coins.	
41	11½	neither	Repeats 6 numbers (1 trial correct out of 3): 2 5 0 3 6 4...., 8 5 3 9 1 6...., 4 7 1 5 8 2....	
AGE IX.				
(Children aged 8 to 9, or in standard II., should do half the following tests.)				
42			Names the months of the year (in 15 secs., with only 1 error): J...., F...., M...., A...., M...., J...., Jy...., A...., S...., O...., N...., D....	
43			Names 9 coins (in 40 secs., two trials if necessary): ½d...., 2s...., 10s...., 6d...., ¼d...., 2s. 6d...., 1d...., 1s...., £1....	
44	12½	'08	Reads, without assistance, passage prescribed; and recalls 6 items out of 20.items.	
45			Defines in terms superior to use (3 out of 5): (i) horse, (ii) chair, (iii) mother ,, (iv) table, (v) fork	

Number of Test	Border-line.	Scale.	Tests.	Success of Response.
AGE X.				
(Children aged 9 to 10, or in standard III., should do half the following tests.)				
46	13½		Arranges 5 weights in order (2 out of 3 trials correct, the whole in 3 mins.): (i)...., (ii)...., (iii).... Procedure:	
47			Builds 2 sentences with 3 words in 1 min.: "London, money, river." Number of sentences given...., viz. "....."	
48		'11	Draws 2 designs shown simultaneously for 10 secs. (1½ correct): (i)...., (ii)....	
AGE XI.				
(Children aged 10 to 11, or in standard IV., should do half the following tests.)				
49	14½		Explains absurdities (3 out of 5 in 2 mins.): (i) Cyclist killed ; may not get better (ii) Three brothers,—Jack, Tom, and self (iii) Railway accident ; not serious ; 47 killed (iv) Girl cut in 18 pieces ; killed herself (v) Shall not kill myself on Friday because unlucky	
50			Answers difficult questions (3 out of 5 in 20 secs. each): (i) What to do, if late going to school (ii) What to do, if asked about boy, not known (iii) Why forgive unkindness if done when angry ? (iv) Why judge a person by what he does, not by what he says ? (v) What to do before undertaking something important	
51	15½		Gives 60 words in 3 mins. Chief topics : / / / / / / Total	
52			Repeats 7 numbers (1 trial correct out of 3): 9 6 8 4 7 5 1, 4 8 2 0 3 6 5, 5 9 2 8 1 3 6	
53			Builds 1 sentence with 3 words in 1 min.: "London, money river." No. of sentences given...., viz. "....."	
AGE XII.				
(Children aged 11 to 12, or in standard V., should do half the following tests.)				
54			Gives 3 rhymes (like Jill, hill, etc., in 1 min.) to "obey" : (i)...., (ii)...., (iii)....	
55			Rearranges mixed sentences (2 out of 3 in 1 min. each): (i)...., (ii)...., (iii)....	
56			Pictures. Interpretation (infers situation ; or suggests emotion, in 2 out of 3): (i)...., (ii)...., (iii)....	

Number of Test.	Border-line.	Scale.	Tests.	Success of Response.
			AGE XIII. (Children aged 12 to 13, or in standard VI., should do half the following tests.)	
57		'11	Resists suggestion of lines (2 out of 3 equal pairs). Pairs : (iv)....., (v)....., (vi)..... correct judgments.	
58			Solves 2 circumstantial problems : (i) Dead body....., (ii) man dying....	
			AGE XIV. (Children aged 13 to 14, or in standard VII., should do half the following tests.)	
59			Repeats 26 syllables : "The other morning I saw in the street a tiny yellow dog. Little Maurice has spoilt his new apron."	
60			Defines abstract terms : (i) Kindness (ii) Justice (iii) Charity	
			AGE XV. (Children aged 14 to 15, or in standard ex-VII., should do half the following tests.)	
61			Draws the folded and cut paper : holes.	
62			Gives difference between abstract terms (2 out of 3): (i) idleness—laziness ,.... (ii) poverty—misery ,.... (iii) evolution—revolution ,....	
63			Draws the reversed triangle (C at B ; and AC along AB): (i) ACB a right angle (ii) AC shorter than AB (iii) CB shortest	
			AGE XVI (Children aged 15 to 16 should do at least one of the two following tests.)	
64		'11	Re-states Hervieu's Reflection on Life : It is neither good nor bad, but mediocre ; for It is not so good as we wish,.... It is better than others wish for us	
65		'11	Gives 3 differences between a President and a King : (i) Not hereditary....., (ii) not life-long....., (iii) powers more limited	

Total number of tests passed (actually or implicitly). _____

Mental Age (M). (To be obtained by means of Table I.)

Physical Age (A).....

Retardation or Advancement ($A \sim M$).....

Mental Ratio $\left(\frac{M}{A}\right)$

Explanatory Note.—The ages in the second column (headed “borderline”) are set against figures in the preceding column, which indicate the number of tests that should, theoretically, be passed at each year specified before a child can be rated as normal. Thus, at age $10\frac{1}{2}$, a child who answers more than thirty-seven tests is (so far as can be judged by the Binet-Simon scale) unfit for a special (M.D.) school. The examiner will abstain from inferring that the test thus numbered must necessarily be crucial for that age¹; and, generally, from using this theoretical indication in any rigid or mechanical fashion.

The figures in the column headed “scale” indicate, for tests omitted in either the 1908 or the 1911 version, which scale included them. “Neither” indicates that the test specified was omitted in both.

AGE ASSIGNMENTS OF THE BINET-SIMON TESTS.

The summary printed above (Schedule I, pp. 35 to 40) gives a list of the original Binet-Simon Tests in their order of difficulty for English school children, with the age-assignments carefully revised. To use either the old Binet Scale, or one of the new American revisions—whether Goddard’s, Yerkes’, Terman’s, or some other’s—without first correcting the foreign age-assignments, and measuring the effect of the inevitable changes in idiom and in coin-nomenclature, is to do grave injustice to many individual cases.¹

It is unnecessary to encumber a portable handbook with forty pages of minute instructions as to the procedure and directions for each of the sixty-five tests. For details, therefore, the novice must be referred either to one of the numerous text-books on the subject or to the full and elaborate explanations given in my larger volume.² The present record-sheet will serve as a convenient reminder of the test-questions that are to be asked; and will suggest a systematic plan for registering responses, wherever these are to be preserved in full.

The mental age can be read off at once by means of the key (Table I, p. 34). It should be noted that Binet’s method of numbering the years differs from that which would seem most natural to the English teacher. By “tests for age III,” Binet means tests every one of which must be correctly answered before a child can score a mental age of 3·0 years. Thus they are really tests for children aged two last birthday. For my own scales I have preferred to retain the teachers’ customary method of stating age, meaning always by “age two—,” for example, age two last birthday, *i.e.* two years plus a fraction. Binet’s age-arrangement is indicated by printing the figures in Roman instead of Arabic numerals.

(¹) The new tests in the Stanford Revision were not available when my original investigation was made. The main difference between this recent adaptation and the original set of questions used by Binet and Simon lies in the addition of a number of new tests for the higher ages. For the lower ages there is little difference between Terman’s arrangement and my own. In London most school medical officers, and a large number of teachers, still prefer to use the original set of questions. For these, therefore, a re-arrangement which gives the ages most appropriate for English children will probably be found of practical service. Those who think of using the Stanford Revision must remember that this version has never yet been re-standardised for use in this country. Upon such a re-standardisation I am at present engaged, with the kind consent of Professor Terman and the assistance of many English co-workers.

(²) These will be found conveniently reproduced in Dr. Ballard’s book on *Mental Tests*, pp. 50–89.

1. TEST MATERIALS FOR THE BINET-SIMON TESTS.

FIGURE 9 (*a*).

AGES III., VI., and XII.

Tests 6, 29, and 56.

(*For instructions see pp. 26-27.*) ¹

⁽¹⁾ As before, the references appended to the title of each test are to the instructions given in the larger volume on *Mental and Scholastic Tests*, not to pages of the present handbook.

(i).



FIGURE 9 (*b*).

AGES III., VI., and XII.

Tests 6, 29, and 56 (*continued*).

(*For instructions see pp. 26-27.*)

(ii).



FIGURE 9 (c).

AGES III., VI., and XII.

Tests 6, 29 and 56 (*continued*),

(*For instructions see pp. 26-27.*)

(iii).

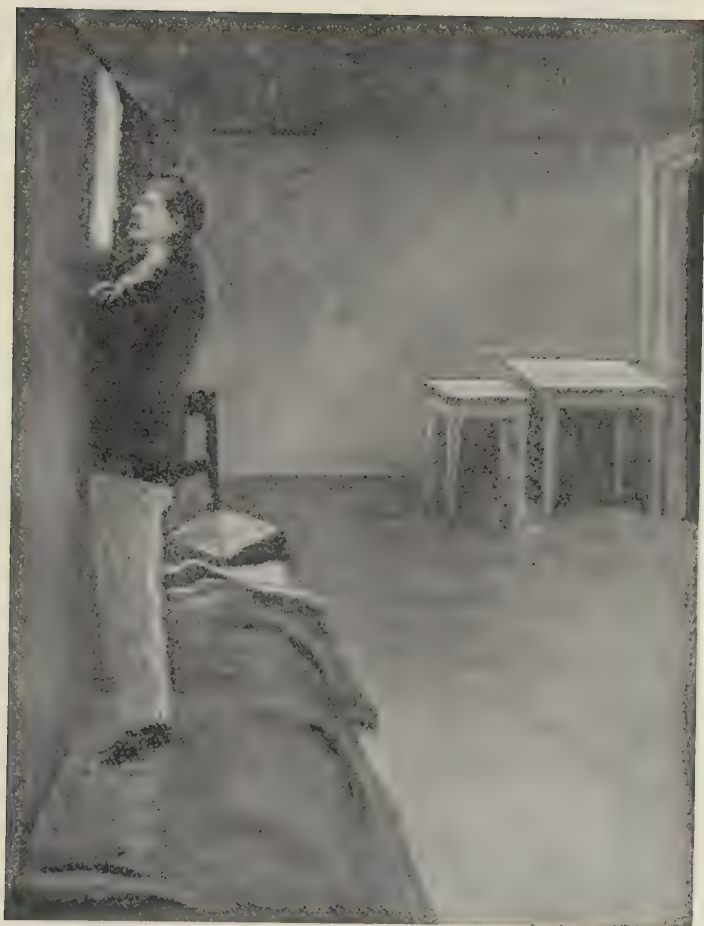


FIGURE 10.

AGE IV.

Test 10. Comparing Lines.

(For the first attempt the figure is to be shown to the child with the lines horizontal and the smaller above the larger.)

(For instructions see p. 29.)

FIGURE 11 (*a*).

AGE IV.

Test 11. Comparing Faces.

(*For instructions see p. 30.*)



FIGURE 11 (b).

AGE IV.

Test 11. Comparing Faces (*continued*).

(*For instructions see p. 30.*)



FIGURE 11 (c).

AGE IV.

Test 11. Comparing Faces (*continued*).

(*For instructions see p. 30.*)

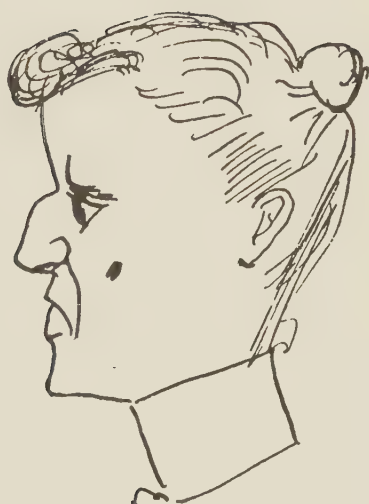


FIGURE 12.

AGE V.

Test 13. Copying a Square.

(For instructions see pp. 30-32.)



FIGURE 13.

AGE V.

Test 17. Naming Four Colours

(For instructions see p. 34.)

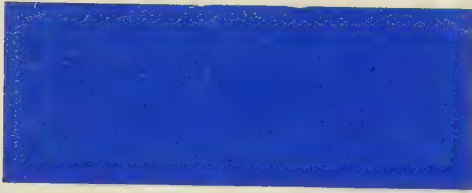


FIGURE 14.

AGE VI.

Test 22. Copying Diamond.

(The figure is to be shown to the child with the long axis vertical.)

(For instructions see p. 36.)

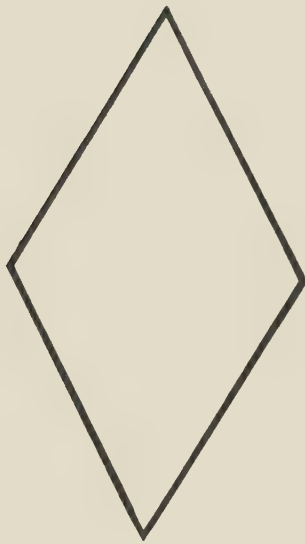


FIGURE 15.

AGE VI.

Test 23. Transcription.

(For instructions see p. 36.)

See little Paul

FIGURE 16 (*a*).

AGE VII.

Test 32. Missing Features.

(*For instructions see pp. 43-44.*)



FIGURE 16 (b).

AGE VII.

Test 32. Missing Features (*continued*).

(*For instructions see pp. 43-44.*)



FIGURE 16 (c).

AGE VII.

Test 32. Missing Features (*continued*).

(*For instructions see pp. 43-44.*)



FIGURE 16 (*d*).

AGE VII.

Test 32. Missing Features (*continued*).

(*For instructions see pp. 43-44.*)



FIGURE 17.

AGES VIII. and IX.

Tests 36 and 44. Reading and Reproduction.

(For instructions see pp. 46-47.)

THREE HOUSES ON FIRE.

LONDON,
September 5th.

A big fire last night burnt down three houses in the middle of the city.

Seventeen families now have no homes. The loss is more than 150,000 pounds.

A young barber, who saved a baby in the cradle, was badly burnt about the hands.

FIGURE 18.

AGE X.

Test 48. Memory Drawing.

The figures are to be shown to the child with the truncated pyramid to the left, and the Greek key pattern to the right.

(For instructions see pp. 53-56.)

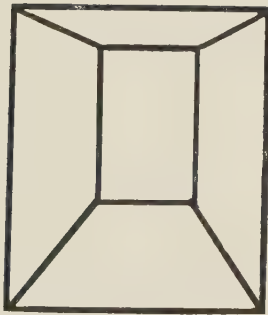


FIGURE 19.

AGE XII.

Test 55. Rearranging Mixed Sentences.

(For instructions see p. 61).

(i)

a defends
master dog good
bravely his.

(ii)

my asked paper
the I teacher
correct to.

(iii)

started the for
morning early this
we country.

FIGURE 20 (a) to (f).

AGE XIII.

Test 57. Suggestion.

(For instructions see p. 62).

—

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Test 29.—GRADED REASONING TESTS.

(Short List.)

The questions are to be read by the child himself. For younger children it is more convenient to have each problem cut out and pasted, or else clearly typed, upon a separate card. The problem is handed to the child with the following explanation: "Will you read this, please? At the end you will find a question. When you have read the question, look carefully again at what is printed above it, and try whether you can think out the answer." The younger and duller children should read each problem aloud. Those of higher level (standard III. or above) need only read aloud the first few. If unable to pronounce a particular word, or if unfamiliar with its meaning, a child may be assisted. When it is clear that the child understands his task, he should be left quietly puzzling over the question, forgetful, as far as possible, of the examiner's presence. As soon as the answer is given, it is accepted with a word of praise, and the child asked to give his reasons. If answer and reasons are incorrect, the child is then asked to try again, until he either succeeds, or fails in four successive attempts. Every child should work forward from the easiest example until he fails on at least three consecutive problems.

One mark is given for each test correctly answered and correctly reasoned. The additional trials should not exceed three in all for one test. For each unsuccessful attempt a quarter of a mark is deducted. A fraction—as a rule, a quarter, a half, or three-quarters respectively—is also deducted or an ill-expressed reason, an inadequate reason, or no reason at all.

1. Tom runs faster than Jim :
Jack runs slower than Jim.
Which is the slowest of the three ?
7 Years.
2. Kate is cleverer than May :
May is cleverer than Jane.
Who is the cleverest—Jane, Kate, or May ?
3. I have bought the following Christmas presents : a pipe, a blouse, some music, a box of cigarettes, a bracelet, a toy engine, a bat, a book, a doll, a walking-stick, and an umbrella.
My brother is eighteen : he does not smoke, nor play cricket, nor play the piano.
I want to give the walking-stick to my father, and the umbrella to my mother.
Which of the above shall I give my brother ?
8 Years.
4. I don't like sea voyages :
And I don't like the seaside.
I must spend Easter either in France, or among the Scottish Hills, or on the South Coast.
Which shall it be ?
5. The person who stole Brown's purse was neither dark, nor tall, nor clean-shaven.
The only persons in the room at the time were—
1. Jones, who is short, dark, and clean-shaven :
2. Smith, who is fair, short, and bearded :
3. Grant, who is dark, tall, but not clean-shaven.
Who stole Brown's purse ?

9 Years.

6. Three boys are sitting in a row :
 Harry is to the left of Willie :
 George is to the left of Harry.
 Which boy is in the middle ?
7. In cold, damp climates, root crops, like potatoes and turnips, grow best :
 In temperate climates, there are abundant pastures, and oats and barley flourish :
 In sub-tropical climates, wheat, olives, and vines flourish :
 In tropical climates, date-palms and rice flourish.
 The ancient Greeks lived largely on bread, with oil instead of butter : they had wine to drink and raisins for fruit.
 Which climate do you think they had ?

10 Years.

8. There are four roads here :
 I have come from the south and want to go to Melton.
 The road to the right leads somewhere else :
 Straight ahead it leads only to a farm.
 In which direction is Melton—North, South, East, or West ?
9. The doctor thinks Violet has caught some illness.
 If she has a rash, it is probably chicken-pox, measles, or scarlet fever :
 If she has been ailing with a cold or cough, she may develop whooping-cough, measles, or mumps.
 She has been sneezing and coughing for some days : and now spots are appearing on her face and arms.
 What do you think is the matter with Violet ?

11 Years.

10. Where the climate is hot, gum-trees and rubber will grow :
 Heather and grass will grow only where it is cold :
 Heather and rubber require plenty of moisture :
 Grass and gum-trees will grow only in fairly dry regions :
 Near the river Amazon it is very hot and very damp.
 Which of the above grows there ?
11. Father has just come home in a brand new overcoat : there is clay on his boots and flour on his hat.
 The only places he can have been to are Northgate, Southgate, Westgate, or the City ; and he has not had time to go to more than one of these.
 There is no clay anywhere in the streets except where the pavement is up for repair.
 There are tailors' shops only in Southgate, Westgate, and the City.
 There are flour mills only in Northgate, Westgate, and the City.
 I know the roads are not being repaired in the City, though they may be in the other places.
 Where has father been ?

12 Years.

12. I started from the church and walked 100 yards :
 I turned to the right and walked 50 yards :
 I turned to the right again and walked 100 yards.
 How far am I from the church ?
13. Field-mice devour the honey stored by the humble-bees : the honey which they store is the chief food of the humble-bees.
 Near towns, there are far more cats than in the open country.
 Cats kill all kinds of mice.
 Where, then, do you think there are most humble-bees—
 in the neighbourhood of towns or in the open country ?

13 Years.

14. A pound of meat should roast for half an hour :
 Two pounds of meat should roast for three-quarters of an hour :
 Three pounds of meat should roast for one hour :
 Eight pounds of meat should roast for two hours and a quarter :
 Nine pounds of meat should roast for two hours and a half.
 From this can you discover a simple rule by which you
 can tell from the weight of a joint for how long it
 should roast ?
15. What conclusion can you draw from the following facts ?
 Iron nails will not float in a pool :
 A cup of pure gold dust weighs nearly twenty times as much as a cup
 of water of the same size :
 If you drop a silver sixpence or a copper coin into a puddle, it will sink
 to the bottom :
 A cubic inch (about a tablespoonful) of water weighs less than half an
 ounce ; a cubic inch of brass weighs over two ounces :
 A leaden weight will drop to the bottom of the ocean.
 Sum up all these observations in one short statement of the
 following form : " Most — are — — — — — "

14 Years.

16. John said : " I heard my clock strike yesterday, ten minutes before the
 first gun fired. I did not count the strokes, but I am sure it struck
 more than once, and I think it struck an odd number."
 John was out all the morning from the earliest hours : and his clock
 stopped at five to five the same afternoon.
 When do you think the first gun fired ?
17. Captain Watts and his son James have been found shot—the father in the
 chest and the son in the back. Both clearly died instantaneously.
 A gun fired close to the person—as, for example, when a man shoots him-
 self—will blacken and even burn the skin or clothes : fired from a
 greater distance, it will leave no such mark.
 The two bodies were found near the middle of a large hall used as a rifle
 range. Its floor is covered with damp sand, which shows every foot-
 print distinctly. Inside the room there are two pairs of footprints
 only. A third man standing just outside the door or window could
 aim at any part of the room : but the pavement outside would
 show no footmarks

Under Captain Watts' body was found a gun: no such weapon was found near James.

In each case the coat, where the bullet entered, was blackened with gun-powder, and the cloth a little singed.

Captain Watts was devoted to his son, and would have died sooner than harm him purposely: hence it is impossible to suppose that he killed him deliberately, even in self-defence. But some think that James secretly disliked his father, and hoped to inherit his fortune at his death.

(1) Was Captain Watts' death due to murder, accident, or suicide?

(2) Was James' death due to murder, accident, or suicide?

3. THE PORTEUS MAZE-TESTS.

The procedure which I recommend, modified in some slight measure from that of Professor Porteus, is the following. For all children above the level of an infants' school, the examiner begins with the maze for age V. The child is told to "suppose this is a road and these are little side-streets. The lines are walls which you cannot get over. Start with the pen from the mark at the top, and show me how you would get out by the quickest way you can find. Put your pen, first of all, on any openings that you see." (The two openings are indicated by or to the child.) "All the other ways are closed." (Point to them in succession.) "Don't go up any of the blocked turnings. Go down this street from the top, and then out by the first opening you can see." To avoid marking the paper, the child uses a dry pen, a pointed stick, or (best of all) a camel's hair brush. After he has once begun, he should not lift his pointer from the paper.

With the succeeding mazes the openings are not indicated first of all; and to older children the patterns are best described as a "plan of the paths in a garden." Emphasise that the child must find his way out of the garden without turning up any of the paths that are closed; and, as soon as he enters a blind alley and has discovered that his road is blocked, do not allow him to correct his mistake by retracing his path, but bring him back to the starting-point for a second trial. If for some reason—for example, a suspected accident in a successful second trial—a third attempt seems needed, invert the diagram, and treat it as a new test.

For scoring the results the following method is to be observed, as indicated at the head of each pattern. One mark is awarded for each test correctly performed on the first trial. Half a mark only is allotted if a second trial is necessary for success. To the total number of marks thus gained, add four for presumable success in imaginary tests for ages I to IV; the result will give the child's score approximately in terms of a mental age. There is no test for age XIII. But four trials are allowed with the mazes for ages XII and XIV. With that for age XII one mark is granted for a success in any of the first three trials; and half a mark for a success in the fourth. But with that for age XIV two marks are allowed for a success in the first trial; and for every further trial required half a mark is deducted from the total of two; thus a child who does not succeed until the second trial scores only one and a half, and so on.

With the patterns for ages III and IV the child has simply to follow the general shape of the figure by drawing his pencil between the two lines. The examiner demonstrates what is to be done by visibly marking the route with his pencil upon a separate home-made copy. In the pattern for

age III the child passes the test if he does not cross the lines, or cut off corners, in more than three places ; in that for age IV, if he does not cross the lines more than twice. In each case, a full mark is awarded for a success in either one of the two permissible trials. With the maze for age V. half a mark only is allotted if the child passes out by thesecond, or lower, opening. These simpler patterns, however, are of value chiefly as offering a preliminary practice to the younger or duller child. Throughout, the mode in which the child proceeds—his care, his foresight, and his self-control, his power to profit by mistakes, his success in analysing by the eye a somewhat intricate design—are far more significant than his absolute score. The examiner, therefore, should watch the child's method of attack as well as count up the number of his successes.

FIGURES 28 TO 38.

Test 30.—PORTEUS MAZES.

FIGURE 28. YEAR III.

Allow demonstration, 2 trials, and 3 errors.

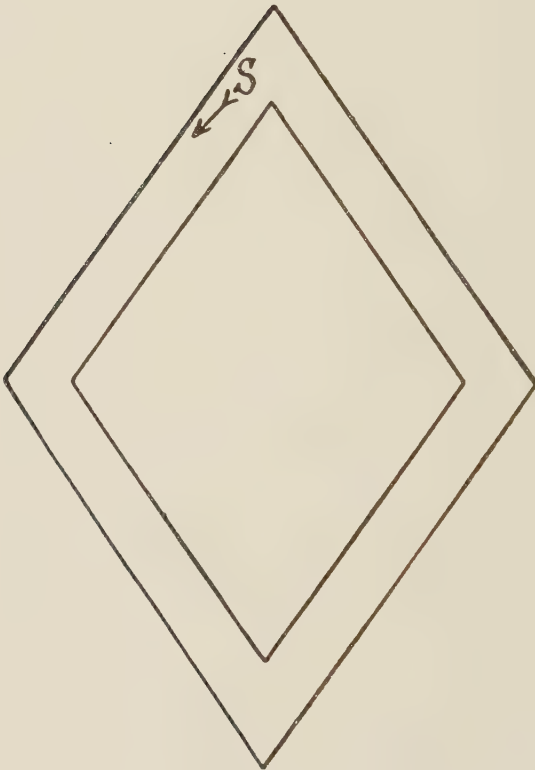


FIGURE 29. YEAR IV.

Allow demonstration, 2 trials, and 2 errors.

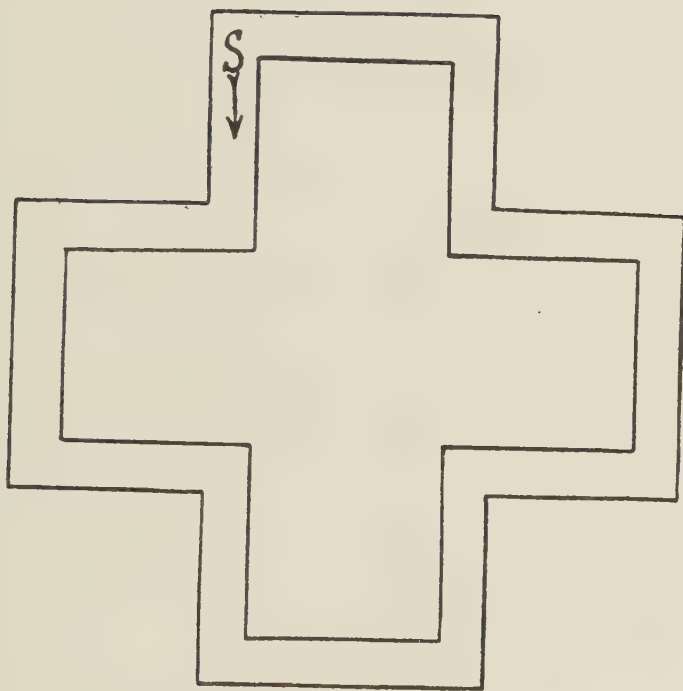


FIGURE 30. YEAR V.

Demonstrate openings : deduct $\frac{1}{2}$ mark for 2nd trial.

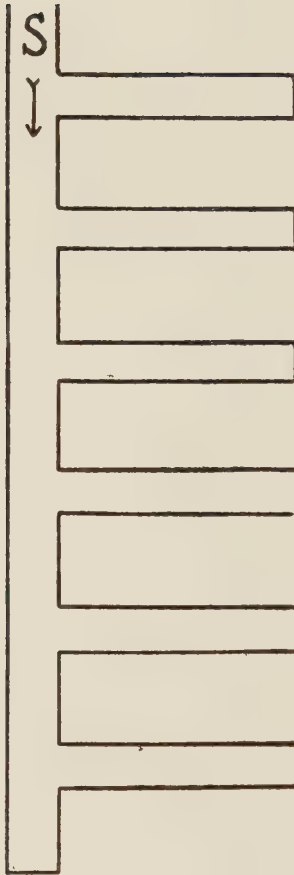


FIGURE 31. YEAR VI.

No demonstration : deduct $\frac{1}{2}$ mark for 2nd trial.

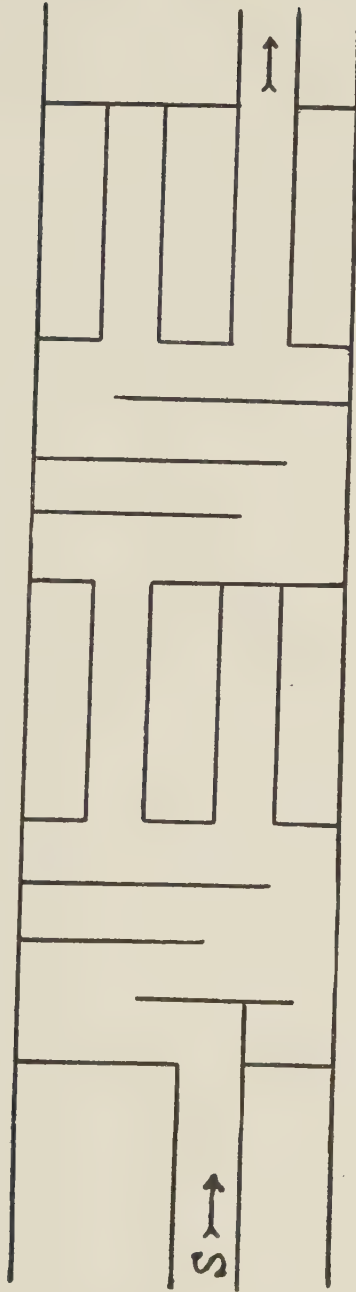


FIGURE 32. YEAR VII.
 $\frac{1}{2}$ mark for 2nd trial.

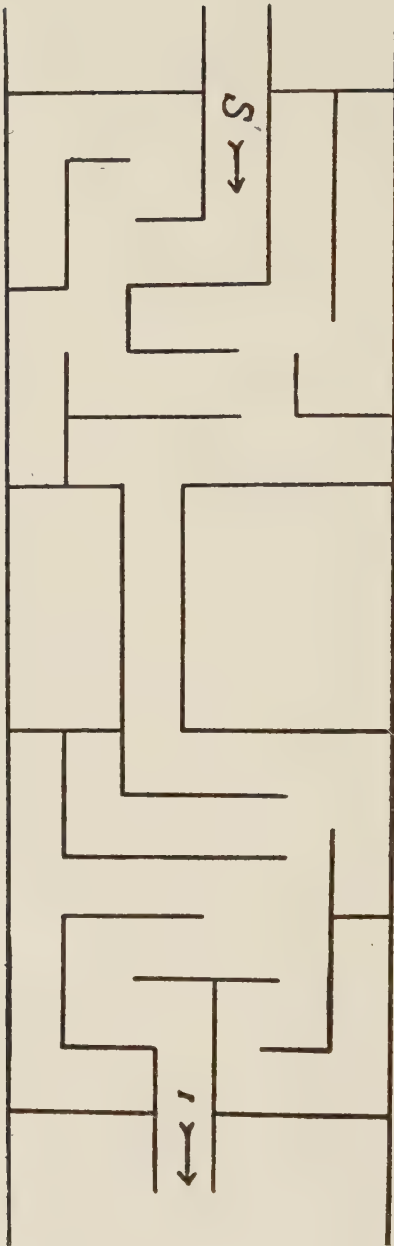


FIGURE 33. YEAR VIII.

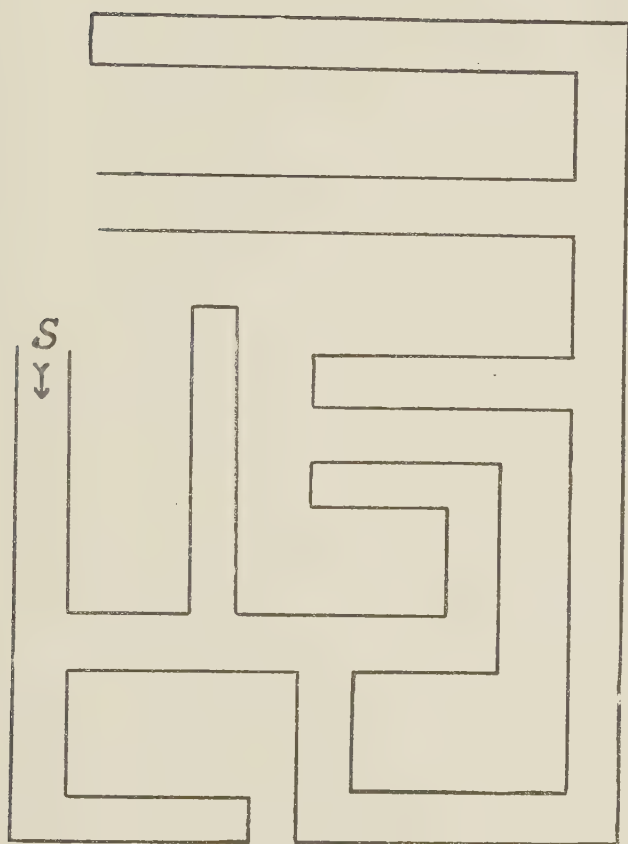
 $\frac{1}{2}$ mark for 2nd trial.

FIGURE 34. YEAR IX.

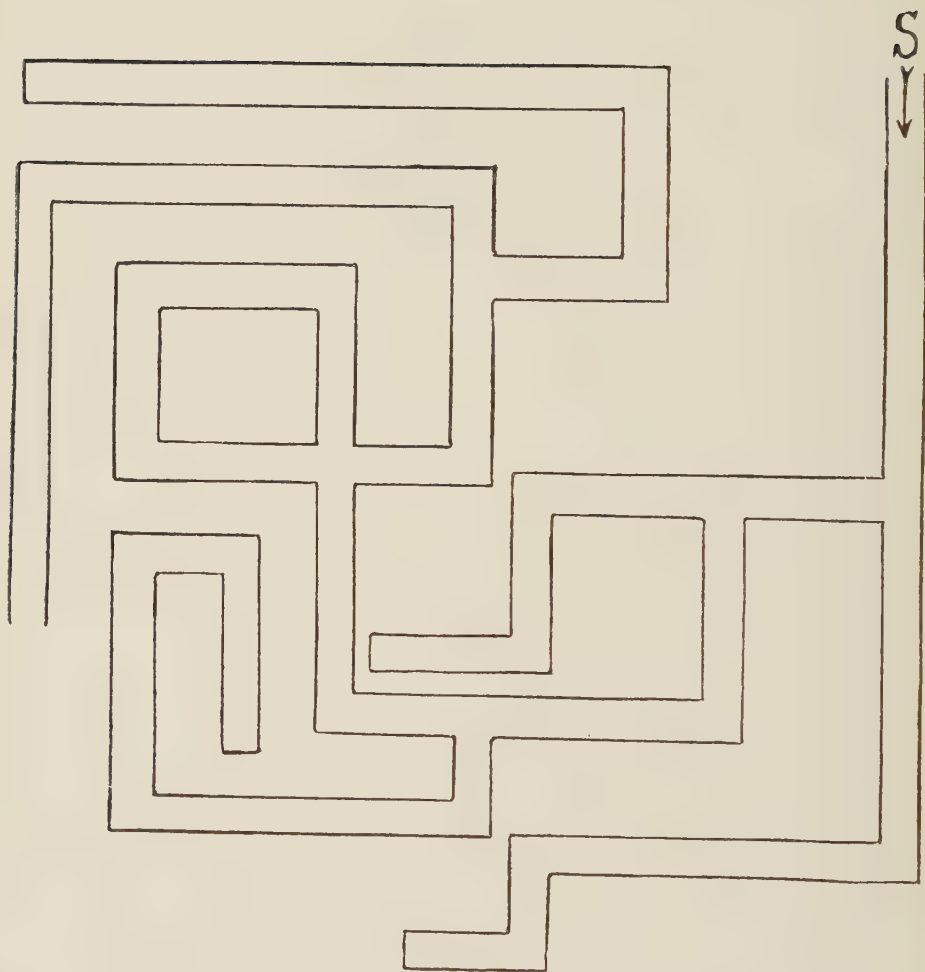
 $\frac{1}{2}$ mark for 2nd trial.

FIGURE 35. YEAR X.

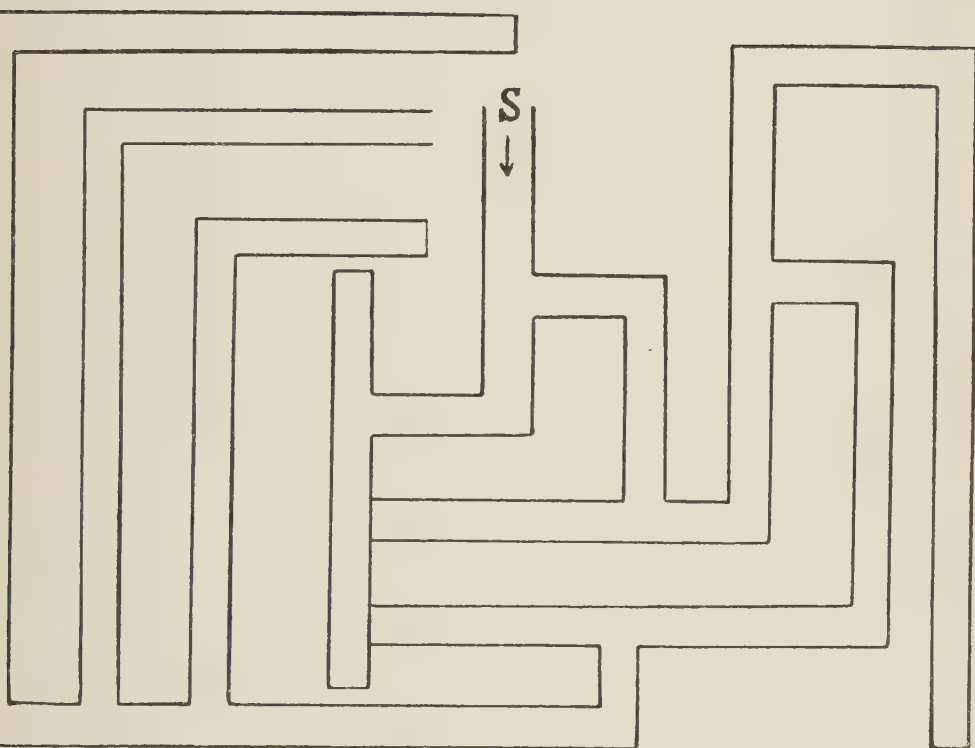
 $\frac{1}{2}$ mark for 2nd trial.

FIGURE 36. YEAR XI.

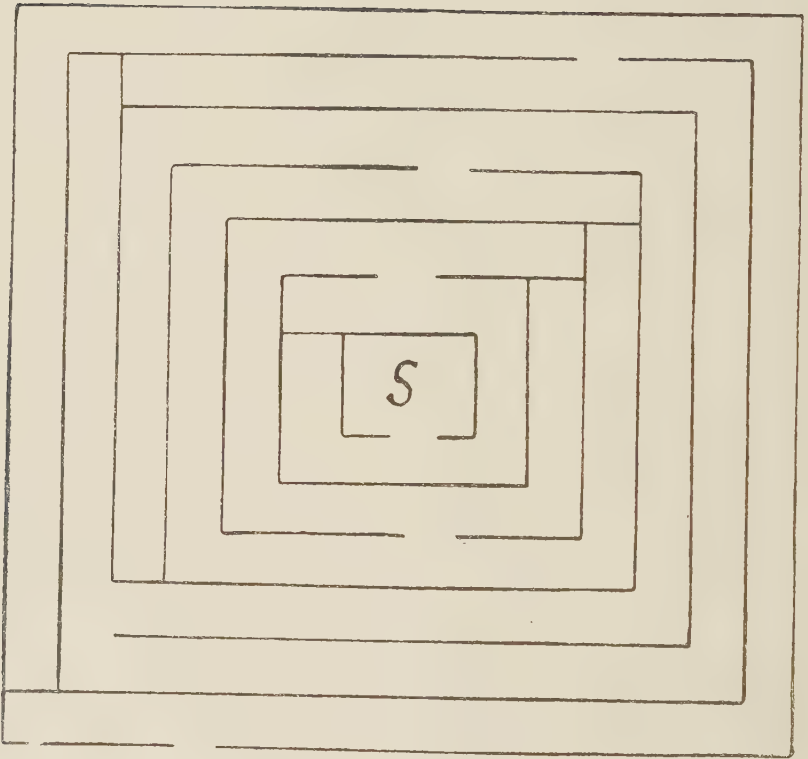
 $\frac{1}{2}$ mark for 2nd trial.

FIGURE 37. YEAR XII.

1 mark for 1st, 2nd or 3rd trials; $\frac{1}{2}$ mark for 4th trial.

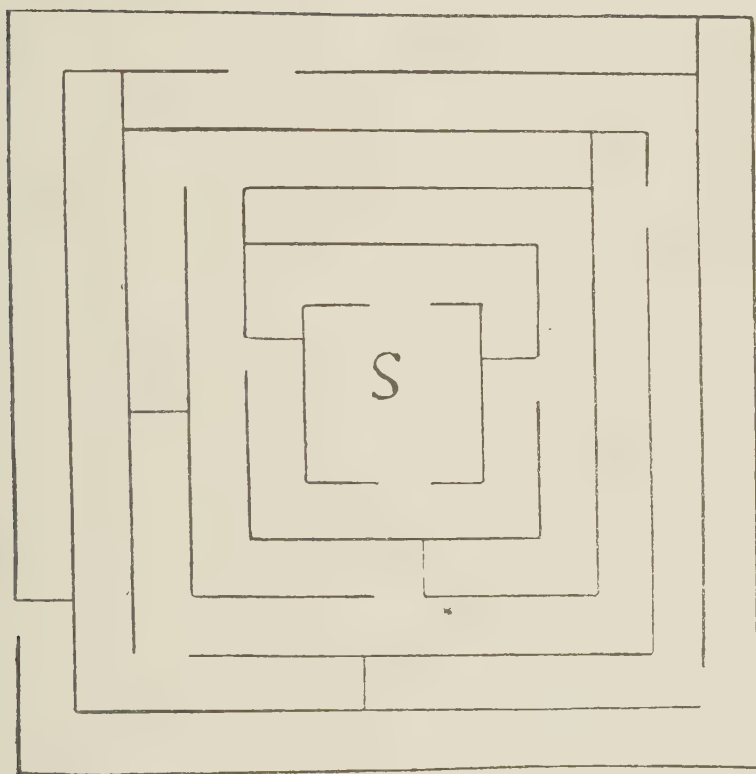
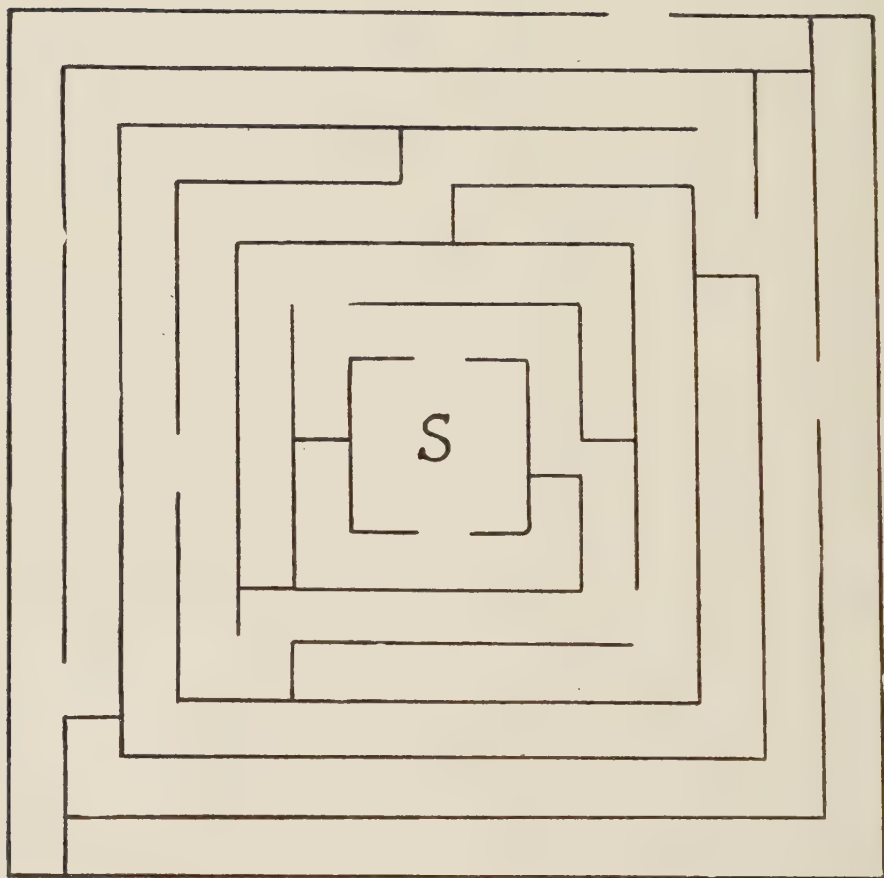


FIGURE 38. YEAR XIV.

2, $1\frac{1}{2}$, 1, $\frac{1}{2}$ marks for 1st, 2nd, 3rd, 4th trials respectively.



LONDON COUNTY COUNCIL

Mental and Scholastic Tests.

By CYRIL BURT, M.A., D.Sc. (Oxon.).

Psychologist, Education Officer's Department, London County Council. With a Preface by SIR ROBERT BLAIR, LL.D., Education Officer, London County Council. *Revised Edition* (reprinted), 1927, Royal 8vo., pp. xv+432. Numerous Illustrations. Cloth, 18s. net.

Contains practical scales and group tests for the measurement of ability and standardised tests for the chief subjects of the elementary school curriculum; acquaints the modern teacher with the latest methods of psychological diagnosis; and details educational means for the treatment of backwardness and other educational disabilities.

"The report . . . on 'Mental and Scholastic Tests.' . . . has been long and eagerly expected. For the English Psychologist at least it will remain for many a long day the standard treatise on the Binet-Simon scale of measuring intelligences and the standard exposition of the technique of mental testing."—*The Times* (*Educational Supplement*).

"The book is, of course, an encyclopædia of information upon the whole matter of mental tests. . . . There are tables and graphs and appendices and illustrations most laboriously and carefully put together and most effectively set out. . . . Throughout the detail and the minutiae, the writer, never, we feel, quite loses the larger vision. . . ."—*The School Guardian*.

"These memoranda include a very valuable series of investigations which cannot fail to be of great value to educationalists and those engaged in school medical inspection. The London County Council is to be congratulated on their publication."—*The British Medical Journal*.

"It would be difficult to over-praise this book, difficult to over-estimate its importance as a contribution to the literature of education. It is a big book in every sense. . . . And although it costs a guinea, it is probably the cheapest educational book on the market to-day."—*The Teachers' World*.

"Dr. Cyril Burt's elaborate psychological survey of the children in the London County Council schools is regarded by many educationalists as the forerunner of similar investigations in other parts of the country."—*Yorkshire Post*.

"The ideal in any system of education is to classify children in the normal, subnormal and supernormal degrees; and the best psychological research goes far to prove that this ideal is only to be approached by substituting for the present methods of 'examination,' which are chiefly a test of training or of memory, what is called the test of intelligence, which shows a child's fitness to acquire knowledge."—*Daily News*.

"This long-expected book is characterized by the scholarly care and thoroughness which we have learned to look for in everything that Mr. Burt produces. . . . Makes pleasant reading; for the author is among the few who write with the precision of the man of science and the claim of the man of letters."—CRITICAL NOTICE OF THE FIRST EDITION. By Dr. P. B. BALLARD. *The British Journal of Psychology*, July, 1922.

"This is perhaps the most important work on educational psychology ever published in England, important not so much for what it does as for the method used in doing it, and the promise of future progress which that scientific method gives. It presents the results of Mr. Burt's work as a psychologist among London children, and includes a set of Reasoning Tests specially devised by Mr. Burt and a record of standard performances in the ordinary school subjects."—Prof. G. H. THOMSON in *Mind*, April, 1923.

"Mental testing in America has been injured because it happened to be exploited commercially and politically long before honest investigation had gone beyond the most tentative experiments. In the resulting confusion what we seem to need most is to take stock. We need a revaluation which will give us some sort of trustworthy notion of how to interpret the tests. I am inclined to believe that such a revaluation has been made by one of the great authorities on the subject and that if his report were studied and taken to heart as a model of method and temper, mental testing in America would free itself from the dangers of foolish boasting and obscurantist objection. The Author of this revaluation is Dr. Cyril Burt, psychologist in the Education Officer's Department of the London County Council."—Mr. WALTER LIPPMANN in *The New Republic*, 2 May, 1923.

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